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Evaluation of a collaborative approach to mediate conflict between parties with interests in wildlife and livestock in Colorado

by

Gina Marie McAndrews

A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Ecology and Evolutionary Biology

Major Professor: Ricardo J. Salvador

Iowa State University

Ames, Iowa

2001

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Evaluation of a collaborative approach to mediate conflict between parties with interests in wildlife and livestock in Colorado

Gina Marie McAndrews

Major Professor: Dr. Ricardo J. Salvador
Iowa State University

The Habitat Partnership Program (HPP) is a collaborative initiative of the Colorado Division of Wildlife and the Colorado Cattleman's Association. The program consists of 15 committees, distributed over western Colorado, representing the interests of public resource managers, livestock growers and hunters. Through partnerships and projects, each committee strives to reduce fence damage and forage loss from big game activity. Information gathered from interviews, documents, projects and observation was used to assess the effectiveness of HPP in meeting its stated goals: resolve conflicts, improve ecosystem health, raise local knowledge about resource management and improve communication and understanding. Over seven years (1991-1998), committees completed habitat improvement projects on 77,856 hectares of public and private land, established 124 water developments and assisted with noxious weed control on 5,904 hectares. In addition, 193 kilometers of new 'wildlife friendly' fence and 60 big game crossings were built. For educational purposes, committees sponsored 31 workshops in holistic resource management and developed 37 brochures on natural resource issues. Ninety-four percent of committee members thought the program improved communication between landowners, sportspersons and government agencies. As measured by independent indicators and the degree of satisfaction of program participants, HPP can be considered an improvement over previous directive programs. However, the continuous influx of people and the loss of habitat in Colorado – over 110,000 hectares per year— may render moot the issues addressed by collaborative wildlife and natural resource management programs.

Graduate College
Iowa State University

This is to certify that the Doctoral dissertation of

Gina Marie McAndrews

has met the dissertation requirements of Iowa State University

Signature was redacted for privacy.

Committee Member

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Major Professor

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For the Major Program

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For the Graduate College

DEDICATION

To Squirt

For the love, patience and friendship
that you have provided

Thank you for being an
important part of my life.

You will always be in my heart.

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Although my name is on the front page, this project is the work and knowledge of many people. I first want to wish heart felt thanks and gratitude to the people who have contributed significantly to my being. My parents, Dave and Mary McAndrews and my brother, Douglas, have supported me through out the years with their endless kindness, understanding, support and unconditional love. My friend and martial arts instructor, Mr. Yong Chin Pak, for teaching me and reinforcing the important values of self-confidence, discipline, honesty, integrity, and persistence. And especially my friend and advising professor, Dr. Ricardo Salvador, for his invaluable guidance, encouragement, friendship, knowledge and uncommon patience through the years. Ricardo has been a true mentor, both academically and personally.

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CHAPTER I
INTRODUCTION

All living beings depend on the earth for survival and it is through a combination of competition, conflict and natural selection that today's mix of species has evolved. All organisms compete for natural resources to meet their basic needs. This interaction can result in conflict if individual actions are incompatible.

Through advances in knowledge, humans have become a dominant force in the appropriation and management of natural resources. All organisms alter their habitat to satisfy their needs and in turn are molded by the environment. Humans, however, differ in the degree and magnitude to which they are able to consciously manipulate their environment to sate their needs and desires. Population size is normally curbed by ecological constraints, such as habitat availability. Humans, however, have become formidable competitors for the resources of nature. Human population has surpassed 6 billion and continues to rise. As more resources are consumed to meet the needs of expanding human populations, native species are being lost or confined to smaller areas.

Ecologists have generated a plethora of literature about mammals, including their behavior, social structure and physiology. Often included in such information are estimates of the amount of habitat required to support given population levels of a species. Less studied and more controversial however, is the amount of habitat needed by people. While estimates of human impacts or, 'footprints', on the ecosystem are available, the magnitude of individual viable footprints differs according to lifestyle (Wackernael and Rees, 1996).

In today's world, competition for natural resources is intensifying and environmental issues are more frequently a topic of national and global concern. There have been international meetings to discuss biodiversity loss, global warming and ozone holes. Reaching agreements at national and global levels has been an ongoing challenge. While all humans have similar needs, societies utilize different methods to satisfy those needs. Even within the same society, people develop different values and interests regarding the environment. For example, people can have divergent views on how resources should be allocated or managed. Consequently, these differences often lead to conflicts over environmental issues.

Environmental conflicts are generally complex. They often involve multiple parties with varying degrees of power, organization and resources. Moreover, the parties have disparate values and interests. The issues frequently involve scientific uncertainty and technical information that can be incomplete or contradictory. The decisions made in environmental conflicts often involve irreversible alterations to the ecosystem, which in turn affect the future generations of all organisms.

Until the 1970s, environmental conflicts in the United States were generally handled through litigation, legislation and administrative fiat. During the past thirty years, however, a growing number of people have employed collaborative approaches to mediate environmental disputes. These alternatives, often referred to as "alternative conflict resolution methods" or "environmental conflict resolution methods," involve collaboration. The parties voluntarily participate in face-to-face discussion and jointly define problems, find facts and develop and assess solutions.

At present, a common environmental issue in the United States is the loss of agricultural land and natural open space to development. As more land is appropriated for human settlement, flora and fauna are being confined to smaller and more fragmented areas. If flora and fauna are recognized as important components in the ecosystem, humans are challenged with finding a balance between 'wild' habitat and 'human' habitat. How these issues are addressed, who makes the decisions and what people think about the topics, depends on the people involved. Politicians, ranchers, public resource managers, developers and ecologists often have different views on the amount of wildlife habitat that should be protected or how big game populations should be managed.

This dissertation examines a program in western Colorado where parties are attempting to address two issues of conflict over ecological resources, 1) conflict between livestock, wildlife and humans for habitat, and 2) conflict between diverse ideologies as to the proper balance of big game, livestock and human populations and habitat. Additional issues involved include determining who should take part in such decisions, and whether people can ensure that outcomes are favorable.

Colorado residents have contested habitat, livestock and wildlife issues for over 50 years. The Colorado Division of Wildlife (DOW) is responsible for managing wildlife

populations on public and private land within the state. In 1931, the Colorado legislature mandated that the DOW be liable for property damage resulting from big game activity. The DOW's traditional method of compensation generally involves paying landowners for the damage received or providing replacement materials for items such as fencing. While this method serves its purpose, conflicts have continued and often recur in the same locations. Since 1931, the number of conflicts has grown. Moreover, since its inception, the traditional compensation process, and the issues it involves have been a point of contention between ranchers, public resource managers, hunters, environmentalists and others.

In 1989, heightened frustration and dissatisfaction with traditional game damage procedures caused leaders of DOW and the Colorado Cattlemen's Association to gather to seek an alternative means to alleviate mutual concerns. Members of these groups assembled a team of public resource managers, agricultural and environmental organization representatives and sportspersons. This team created guidelines to establish a collaborative approach to mediate conflicts involving hunting and ranching interests. The resulting program, called the Habitat Partnership Program (HPP), provides an alternative method of handling damage claims and allows participants to develop creative approaches to reduce wildlife-related conflicts on private and public land.

After reviewing current knowledge regarding environmental conflict and conflict resolution theory, these concepts will be used to evaluate the effectiveness of the Habitat Partnership Program.

CHAPTER II
REVIEW OF LITERATURE

Competition and Conflict

Sources of human conflict

Conflict is a pervasive aspect of life. While flora and fauna generally compete for basic necessities, such as food and water, human disputes are generally more complex. Human conflicts occur at all levels of society, from intrapersonal to international, and over a variety of issues, including ideas, values, and resources. Conflicts generally develop over time and involve the interaction of at least two "actors," which may be individuals, organizations or nations (Wedge, 1987). The chance of conflict occurring is enhanced when the actors perceive they have incompatible goals or interests and decide that there is more to gain (or less to lose) by taking action to confront or reduce the incompatibilities than by ignoring the issue (Sandole, 1987; Deutsch, 1991; Laue, 1987).

When conflicting parties choose to take action, analysts usually note the claims, demands and behavior of the actors, or what Sandole (1987, p. 289) calls "phenotypic phenomena." Sandole argues that often not visible are the "genotypic phenomena," the underlying motivations, perceptions and interpretations of the conflicted individuals.

The genotypic phenomena typically underlying conflicts are struggles between opposing or competing forces involving needs, values and interests (Burton, 1996; Clark, 1990; Druckman, 1993). Burton has identified three main motivations of people in conflict: "those that are universal in the human species (needs), those that are cultural (values) and those that are transitory (interests)" (1996, p. 30-33). Aside from obvious basic needs such as food and shelter, there are inherent human needs related to growth and development (Clark, 1990; Burton, 1990, 1996). Values refer to the ideas, customs and beliefs acquired by a person, and are generally characteristic of an individual's social community. Burton defines interests as "the occupational, social, political and economic aspirations of the individual and of identity groups within a social system that often relate to material goods or role" (1996, p. 33). The interests of conflicting parties tend to be competitive and involve a high win-lose component. However, parties may often have mixed motives, with elements of both competition and cooperation (Druckman, 1993; Burton, 1996).

While human needs are inherent, values and interests evolve over time. People develop their values and interests through perceptions, experiences and interactions with an external environment. Since "inference is involved at all stages of the perceptual process," people can develop different interpretations and explanations of common social values and principles, and may therefore not think and communicate about the same things in the same way (Sandole, 1987, p. 292). A person's social environment is a major component in the evolution of individual values and interests. Every organized society has a "dominant social paradigm" which consists of the values, beliefs, interests and institutions that collectively provide the lenses through which individuals and a society interpret the external world (Dunlap and Van Liere, 1978; Milbrath, 1984). In turn, social paradigms condition individual interests, goals and behavior, and "create shared gains and deprivations" that provide a structure for complex societies to function (Milbrath, 1984, p. 7).

The utilitarian paradigm in the United States

One important aspect of the social paradigm that evolved in the United States concerns the interaction of society with the ecosystem. Present environmental conditions reflect a society's historical values, interests and actions towards natural resources. Throughout much of U.S. history, decisions and actions towards the environment were often based on utilitarian, capitalist, and industrialist ideologies, which evolved from a combination of philosophy, reductionist science, and Judeo-Christian traditions (Attfield and Dell, 1997; Katz, 1995; Nash, 1989).

These ideologies have prevailed in the United States for many years, and have frequently guided the actions of both society and public resource managers. At the turn of the 20th century, in response to expanding human populations and resource needs, the government established agencies to manage public land in a utilitarian manner. Driven by fears of resource exhaustion, government agencies were created to manage resources on public land in sustainable fashion while providing services and income from forestry, grazing, mining and other industries. A resource conservation movement, under the leadership of President Theodore Roosevelt and scientist/politician Gifford Pinchot, was underway in the early 1900s (Klyza, 1996; Judge et al., 1991). The movement, supported mostly by a select group of scientists and politicians, focused "almost exclusively on the

management of discrete natural resources so as to ensure 'the greatest good of the greatest number in the long run'" (Judge et al., 1991, p. 6). Natural resources were often viewed as commodities to be managed and utilized, and their utility was measured in economic terms. This, in turn, was used to gauge the value of an action or resource for public good. During the same time period, John Muir initiated a preservationist movement that advocated conserving nature for aesthetic and moral reasons (Judge et al., 1991; Katz, 1995). The preservationists lacked public support, and consequently, economic and utilitarian interests dominated many resource management decisions (Klyza, 1996).

Well into the 20th century, a large portion of society held a utilitarian view of nature. A historical study conducted by Kellert (1996, p. 42), showed that between 1900 and 1958, 45 to 70 percent of US citizens held a utilitarian view of the value of animals and nature, which the author defined as support for "a practical and material exploitation of nature ...for physical sustenance and security."

Industrial and scientific advances strengthened the utilitarian philosophy and contributed to the social paradigm that evolved in the United States. This worldview or "dominant social paradigm," is characterized by belief in abundance and unlimited economic growth, and the beliefs that environmental degradation and risk are necessary by-products of economic growth, but can be controlled and corrected through scientific and technological advances (Milbrath, 1984; Dunlap and Van Liere, 1978; Schnaiberg and Gould, 1994). The dominant paradigm is not necessarily held by the majority, but rather by the dominant groups in society, and nearly all of the values, norms, beliefs and infrastructure of the society are oriented toward maintaining the paradigm (Milbrath, 1984). This model continues to prevail because many people perceive the dominant social paradigm as successful and effective progress for society.

Once established, certain elements of the paradigm are difficult to change because "individual integrity and socially shared definitions of reality are anchored in it" (Milbrath, 1984, p. 7). Moreover, individuals are hesitant to modify personal values and interests. This point is particularly well synthesized by Sandole:

> We tend to internalize those images that make 'sense' to us, that is, have worked for us in the past. Given the nature and pace of our phylogenetic evolution (as contrasted with our cultural/technological evolution), once we have internalized successful survival models, then something in us, perhaps our 'homeostatic,' life-sustaining processes is very reluctant to give them up. We are, in effect, very slow to detect, and then to respond to, changes in our environment. (1987, p. 295)

The environmental paradigm

During the 1960s, a movement began in the United States that challenged the environmental aspect of the 'dominant social paradigm.' Preservationists remained active during the first half of the 20th century, waging battles with Congress and government agencies in efforts to create national parks and protect wilderness areas (Judge et al., 1991). In the 1960s however, public concern over natural resources expanded beyond resource conservation and preservation issues to an interest in environmental quality. The heightened concern reflected recognition by some of the environmental deterioration resulting from post-World War II industrial activity: the manufacture of synthetic chemicals, the effects of pollution and the "economic, political and legal difficulty of addressing environmental degradation" (Judge et al., 1991, p. 7). The wave of environmental legislation that ensued reflects the pattern of public concern, including the 1964 Wilderness Act, the 1964 Land and Water Conservation Act, the 1967 Air Quality Act, the 1968 Clean Water Act and the 1970 National Environmental Policy Act (NEPA).

Over the next decade, public attitudes towards the environment continued to evolve. In their 1978 study, Dunlap and Van Liere noted evidence of the emergence of a "new environmental paradigm" in the United States. This new paradigm recognized public concern for the social and environmental impacts of growth and was ideologically the opposite of the "dominant social paradigm."

As is to be expected, some members of society supported attitudinal changes regarding natural resource use and management while others did not, resulting in increased fragmentation of environmental interests in the United States. Milbrath (1984) surveyed citizens from across the country and concluded that in the early 80s there were two fundamentally different perceptions of environmental problems. He observed that 18 percent

of the public "believe the environmental problem is small, that it can be solved by technical fixes, and that there are no limits to growth." Milbrath found that most business leaders and a majority of public officials and labor leaders held this view. On the opposite end, 19 percent of the public "believe that the environmental problem is large, that it can be solved only by basic change in society, and that there are limits to growth" (1984, p. 44). The results showed that the remainder of people held mixed elements from these two perspectives. Milbrath concludes that this "demonstrates the reality of sharp divisions over these fundamental beliefs in modern society" and that "these sharp divisions on fundamentals imply continued conflict for some time to come" (1984, p. 61).

These 'diverse beliefs' persisted into the 1990s and could be linked to age, gender and educational level. After analyzing responses to surveys, Kellert (1996) found that the elderly generally expressed significantly more utilitarian values toward nature compared to young adults aged 18-25. The elderly expressed greater support for placing economic and social interests over environmental protection, while young adults supported the rights of nature over economic interests and tended to reject the "assumption of human mastery of the natural world" (Kellert, 1996, p. 50). Kellert noted that these views might reflect the recent environmental concern in the U.S. or "less idealistic perceptions" of nature as people age and confront the burdens of family, work and security. He observed that females tended to express greater humanistic and moralistic concerns toward nature and were more likely to join organizations opposed to consumptive use of animals, while men more often supported the "practical exploitation and domination of animals and nature." Kellert found no significant differences among income groups with regard to utilitarian views of nature, but reports that education emerged as the "most powerful force shaping perceptions of nature and living diversity" (1996, p. 56). Comparing five education levels from 'sixth grade or less' through 'some graduate education,' Kellert reports that the higher a person's education, the more likely that person was to express greater concern, interest and knowledge (and a less utilitarian attitude) about nature.

Characteristics of environmental conflicts

Environmental conflicts are complex. They generally involve multiple parties with varying degrees of power, organization and resources, including government agencies,

corporations, citizens and interest groups. The actors frequently have competing interests and different stakes in the outcome (e.g., developers and environmentalists). The issues frequently involve scientific uncertainty and technical information that is incomplete or inadequate (Richman, 1987; Smith, 1987). Also, parties frequently have different sources and interpretations of data. And there is risk. The decisions made in environmental conflicts can involve fundamental and irreversible alterations to the ecosystem, and the long-range effects of the decisions are often unknown. The outcomes affect future generations of all organisms.

Uncertainty and risk surround environmental actions and can cause conflict. There are many aspects of risk, including assessment, perception and communication of the risk, each of which provides opportunity for divergence and conflict. Professional risk assessment frequently requires input from people in various fields, and often the resulting assessments cannot lead to definitive recommendations due to embedded assumptions, subjective bias, errors of omission and unknown latent effects (Susskind and Field, 1996). A number of assumptions need to be made in assessing risk, such as the best way to conduct the study and which information to include. During this process, personal or political biases or organizational affiliations may influence scientific procedures. Consequently, two studies of the same phenomena can have different results. Even when a study procedure has been established, a risk assessor may unintentionally fail to consider relevant aspects. Therefore, risk assessments involve uncertainty and limited knowledge. While the consequences of certain hazards may be obvious, the latent effects of a hazard may take months or years to arise (Susskind and Field, 1996).

Even when scientists have met the challenges of assessing a risk and agree on the results, the public may diverge from professional risk assessments and reach dissimilar conclusions. While many risk assessors believe this is due to public ignorance, Susskind and Field (1996) attribute the discrepancies to other reasons: people questioning the relevance of research conclusions to real life; people weighing consequences differently; citizens allocating benefits and costs differently; and people lacking trust in government and business. Each of these has potential to cause conflict.

Contemporary societies have become more interdependent and complex. With increasing competitive pressures and rapid economic and technological change, the growing

human populace is placing greater demands on natural resources. Regardless of one's age, gender or worldview, environmental issues are more frequently a topic of national and global concern. Reaching agreement at national and global levels has been an ongoing challenge. Despite the fact that humans have similar needs, countries, organizations and individuals utilize different methods to meet the necessities and demands of citizens. Armed with wealth, power and technological and scientific advances, human decisions and actions involving natural resources are impacting organisms and the ecosystem on a grander scale. Many countries are dependent on external resources to meet human essentials. Meeting those needs, given divergent environmental, political and economic worldviews and greater resource demand, has become more challenging. Environmental actions often involve uncertainty and undeterminable risk (MacDonnell, 1988). Moreover, how resources are utilized has become a major economic determinant in many countries, leading societies to develop resources "in a manner that maximizes... welfare" (MacDonnell, 1988, p. 18). The U.S. has simultaneous goals of satisfying social demands, stimulating economic productivity and improving competitiveness, in conjunction with addressing natural resource issues (Gray, 1989). Working toward these goals simultaneously can be viewed as paradoxical and cause contention between people who have different stakes in the outcomes and have diverse views on appropriate use of resources. One example of conflicting interests is multiple use of public land. Mining and logging are often viewed as incompatible with wildlife and habitat protection. While environmental conflicts are inevitable, the associated issues are becoming more challenging to address.

As has been shown here, various aspects of the social, political, economic and biophysical systems are involved in environmental conflicts. The systems are continually evolving, and decisions and actions involving the systems change to reflect society's values, interests and needs (Mitchell, 1995; Painter, 1988). Likewise, people are testing new approaches for handling environmental conflicts. As Dennis Sandole, a long time researcher and instructor in conflict resolution, states, "What is important about conflict is not its occurrence as such, but how parties attempt to deal with it" (Sandole, 1987, p. 3).

Environmental Conflict Resolution

Development of the discipline

Competition and conflict among flora and fauna have been studied in ecological contexts for over a century. However, a more recent development has been to study conflict within human behavioral sciences. Various theoretical approaches for analyzing and understanding human conflict have been developed in several social science fields, including sociology, psychology, law, management, political science and international relations.

Social conflict resolution began as a formal academic discipline in the late 1950s and grew significantly over the succeeding 20 years (Lewis, 1990). During the 1970s, practitioners and scholars from various disciplines found relevance in one another's knowledge and experience, and formed multidisciplinary networks, centers and institutes for conflict analysis and resolution (Deutsch, 1991; Burton, 1990; Wedge, 1987). A common concern of researchers in the field of conflict analysis and resolution has been to discover patterns and "generic explanations for the genesis, maturation and outcomes of conflict" (Brown, 1993, p. 170).

During the middle of the 20th century, ecological issues became more prominent in society. The cluster of environmental legislation that emerged in the U.S. during the late 1960s was succeeded by a rise in the number of court cases involving conflicts over natural resources. Between 1970 and 1971, the number of environmental cases initiated in federal district courts grew from 35 to 85, a 142 percent increase. The following year the number increased another 65 percent to 129 cases (Wenner, 1982). After the initial rise, however, the number of environmental cases introduced into federal district courts leveled off, fluctuating between 100 to 160 cases between 1972 and 1982 (Wenner, 1982).

Part of the increase of environmentally related lawsuits can be attributed to the 1970 National Environmental Protection Act (NEPA) and the Administrative Procedure Act (APA) (Sachs, 1982; Amy, 1987; Burton, 1988). The Acts gave more power to governmental entities to make decisions and power to community organizations to block decisions (Sachs, 1982). With mounting public concern over the environment, citizens created pressures on government agencies to increase public involvement in environmental decision-making. NEPA provided new opportunities for citizens and organizations to challenge parties, such as

developers and government agencies, in court. Citizens cannot bring an issue to court due simply to disagreement with a decision or project. The filing parties must have legal grounds on which to base a case. NEPA and APA, which stipulate specific procedures that government agencies and others must follow on environmental projects, provided these legal grounds (Amy, 1987). For example, NEPA requires Environmental Impact Statements (EIS) for all federal expenditures or actions that affect environmental quality. In turn, an environmental organization can contest an agency's plan if an EIS was not completed adequately.

New approaches for resolving environmental conflict

Until the early 1970s, environmental conflicts in the U.S. were typically addressed through administrative, legislative and judicial systems (Amy, 1987; MacDonnell, 1988). During the late 1970s, people began employing new collaborative methods to mediate environmental conflicts (Amy, 1987). The public desired new approaches because many were dissatisfied with conventional decision making procedures, such as litigation or administrative fiat (Bingham, 1986; Amy, 1987).

Proponents of collaborative methods think that conventional methods are inefficient for resolving environmental conflicts. Recognized drawbacks of conventional approaches are that the methods tend to be competitive and adversarial processes in which parties generally have little involvement in the decision making process or in affecting its outcome (Crowfoot and Wondolleck, 1990). Whether litigating in court or lobbying administrators or legislators, communication is generally a one-way advocacy, with each party presenting a case and hoping for the desired outcome. Moreover, advocates of cooperative methods state that the processes are faulted for frequently requiring extensive amounts of time, money and human resources. Many citizen groups and environmental organizations operate on small budgets and with few staff. In addition, many environmental groups are tax-exempt organizations and the "Internal Revenue Act of 1969 prohibits these groups from spending substantial amounts of money for lobbying" (Amy, 1987, p. 23). The high costs of attorneys and lobbyists, and the time involved in prolonged court cases or legislative sessions can prohibit some groups from participating in judicial or legislative processes.

Innovators in the field of environmental conflict resolution frequently state that the conventional processes are ineffective in resolving the underlying issues involved in environmental disputes. The decisions reached often do not satisfactorily address the complexity of the fundamental issues nor address the interests of all parties (Moore, 1996; Bingham, 1986; Wondolleck, 1985). Environmental conflicts are complex, and courts and public agencies are seldom equipped to handle complicated multiparty conflicts (Richman, 1987). For example, proponents of collaborative methods of conflict resolution claim that judges frequently have little particular scientific expertise, and therefore tend to base decisions on procedural grounds and presented facts. There are specialists in environmental law, however, with the scientific complexity and technical uncertainty surrounding environmental issues, "expert testimony can be produced to substantiate almost every side of an issue" (Susskind and Cruikshank, 1987, p. 36). Likewise, legislators and administrators may understand little of the science behind an issue or may be unfamiliar with site-specific disputes. Moreover, legislators tend to delay controversial environmental issues or end up developing vague legislation that creates conflict during its implementation. Administrative agencies charged with implementing legislation and protecting the environment are politically influenced and as a result, may fail to give sufficient weight to environmental concerns (Amy 1987). Public resource management organizations are involved in many environmental disputes. However, these agencies were created to manage resources and not designed to address the interlinking problems that evolve between the biophysical, social and economic systems (Wondolleck, 1985). An agency's main challenge is that any given standard will please some parties and offend others, and the available scientific data "rarely offers a definitive basis on which to justify the choice of one decision over another" (Susskind and Cruikshank, 1987, p. 36). So while opposing parties invest resources and competitively focus on winning in processes that can go on indefinitely, the underlying issues and problems remain unresolved.

The difference between the traditional methods and the new collaborative approaches to resolving environmental conflict stems from the structure of the method itself: "who is involved, how they are involved, and how issues are framed and then acted upon in making and implementing decisions" (Crowfoot and Wondolleck, 1990, p. 22). Within the relatively

new field, there has been no generally accepted framework that distinguishes different environmental resolution processes. As a result, people use different names for similar approaches. Albeit, the term environmental dispute resolution (EDR) is frequently used. EDR refers collectively to a variety of approaches that "allow the parties to meet face to face to reach a mutually acceptable resolution of the issues in a dispute or potentially controversial situation" (Bingham, 1986, p. xv).

The various approaches to EDR have similar features. The characteristics shared by the collaborative approaches include:

- Voluntary participation by representatives of key stakeholding interests;
- Face-to-face interaction of the parties (negotiation);
- Collaboration by the parties in defining the problem, finding facts and developing and assessing reasonable solutions;
- Mutual agreement by the participants on the process to be used and the decisions that may emerge.

Collaborative processes can occur with or without the assistance of a neutral third party. In some cases, negotiation (the interaction among parties) is facilitated by a neutral third party, called a mediator or facilitator. The role of a mediator varies on a case-by-case basis, and therefore will be discussed in more detail in a later section.

Collaborations may be temporary or may consist of a permanent form of collaboration, such as federations (Wood and Gray, 1991). In the past, EDR was frequently viewed as one-time collaboration with many participants, and the process had a specific end-point, such as writing a rule. Today however, organizations such as the Environmental Protection Agency are initiating long-term collaborative efforts to create institutional frameworks that foster several small collaborative projects (President's Council on Sustainable Development, 1997). EDR processes have been used in a diverse assortment of conflicts, including, land use, water resources, energy, air quality, natural resource management and public land use (Bingham, 1986; Painter, 1988). And a variety of people and organizations have participated in EDR processes, including various combinations of government agencies, local citizens, interest groups, private companies, environmental groups, Native American tribes and private landowners. In an examination of 161 EDR cases, Bingham (1986) found that 82 percent involved government agencies, 35 percent

included environmental groups and 34 percent involved private corporations. Twenty-one percent of the cases involved private companies and environmental groups pitted against each other.

Collaboration is not new

Mediated and negotiated resolutions to various types of conflicts are not new. In fact, for centuries Jewish, Christian, Islamic, Hindu, Buddhist, Confucian religions and many indigenous cultures have effectively used collaboration and negotiation methods to resolve problems (Moore, 1996). In the United States, some Native Americans commonly used consensus-based meetings to settle problems (LeResche, 1993). In addition, religious sects, such as the Puritans and the Quakers, utilized similar nonadversarial practices to resolve conflict in early colonial communities (Moore, 1996).

Collaborative approaches to resolving conflict were formally institutionalized in the United States in 1913, when the government established the U.S. Department of Labor, and thereafter appointed a committee to manage disputes between labor and management (Moore, 1996). Since that time, the use of collaboration has expanded. Today, businesses, government, citizens and non-governmental organizations frequently find themselves involved in collaborative efforts to solve environmental, social and economic problems (President's Council on Sustainable Development, 1997).

One of the first documented cases of collaborative approaches in the environmental arena took place in the Pacific Northwest. Credit for bringing EDR to bear on environmental controversies generally goes to Gerald Cormick and Jane McCarthy (Bingham, 1986). In the early 1970s, the Ford Foundation funded collaborative efforts to resolve conflicts in communities and neighborhoods and Cormick was a mediator supported by the foundation. Having interest in applying mediation techniques to environmental conflicts, Cormick and McCarthy (at the time an environmental consultant), toured the U.S. to interview citizens, government officials and environmental and industry representatives about the potential of using EDR to resolve environmental disputes. In 1973, after discussing environmental issues with officials in the state of Washington, Governor Daniel Evans asked Cormick and McCarthy to help settle a fifteen-year conflict involving a proposed flood-control dam on the Snoqualmie River. Farmers, homeowners and businesses in the flood-affected areas endorsed

the dam. However, a coalition of citizen and environmental groups opposed the dam, maintaining that it would encourage urban sprawl and interrupt a free-flowing river (Amy, 1987). After seven months of negotiations, all of the parties agreed on a set of recommendations and signed an agreement, which proposed a smaller flood control dam at a different location, new land controls and a basin-wide planning committee (Bingham, 1986; Amy, 1987; Mangerich and Luton, 1995). The governor endorsed the agreement and the recommendations. The agreement received local and national recognition, and created a template for the use of EDR in future environmental conflicts.

Since the Snoqualmie River case, the number of collaborative environmental dispute resolution cases and organizations has grown. Combining information from literature, newsletters, correspondence and interviews, Bingham (1986) discovered that in the U.S. there were nine mediated EDR cases recorded at the end of 1977, and an additional 30 cases by the end of 1979. By mid-1984, EDR methods were employed in over 160 environmental dispute cases in the United States. During the same time period, some government groups began integrating the process into their policies. For example, in Washington state, representatives of state agencies and educational institutions collaborated to produce a proposal to establish a "State Council on Dispute Resolution" that would focus on making EDR "part of the organizational culture of state government" (Fiske, 1994, p. 38). The proposal received support and funding. Also, some states institutionalized, by statute, EDR methods to resolve environmental disputes. For example, statutes in Massachusetts, Texas, Virginia and Wisconsin "authorize or even require negotiation of disputes over the siting of solid waste or hazardous waste facilities" (Bingham, 1986, p.xvii).

As a result of the expanding interest in, and utilization of, collaborative processes, organizations, newsletters and educational programs evolved to promote and support EDR in the United States. Organizations, such as the National Institute for Dispute Resolution and the Society of Professionals in Dispute Resolution, provide information and funding to people interested in using EDR to resolve conflicts. Newsletters, such as 'Consensus' (published by Public Disputes Network) and 'Resolve,' (published by RESOLVE) provide information on recent developments in the field, case studies and other resources. Growth in the use of EDR has spawned the development of various EDR training programs, including

the Harvard Program for Negotiation, the Western Rural Development Center (WRDC) and RESOLVE (Center for EDR) (Fiske, 1994). Besides training, RESOLVE focuses on improving dialogue and mediating solutions to solve complex public policy issues in the United States and internationally, and advancing research and practice in the dispute resolution field. Utah State University sponsors the WRDC, which is one of four USDA-sponsored regional centers in the U.S. WRDC participates in rural development research and extension projects with university personnel, policy makers, elected officials and other community leaders to identify key issues shaping the future of rural regions of the western states.

Public resource agencies are frequently involved in environmental conflicts, and many are taking active measures to change the process by which decisions are made. Public agencies have been especially active in establishing procedures to involve the public in decision making and incorporating collaborative face-to-face meetings to resolve problems and conflicts. Wondolleck (1988) notes that the USFS has been a leader in utilizing collaborative approaches to conflicts and decision-making.

It should be noted that while the majority of authors use 'conflict' and 'dispute' interchangeably, some authors do not. Among those who differentiate the terms, 'conflict' generally refers to the "ongoing differences in society over their values and behaviors towards nature", while 'dispute' frequently denotes a specific conflict episode embedded in a larger continual social conflict (Crowfoot and Wondolleck, 1990, p. 18). An experienced mediator in environmental conflicts, Gerald Cormick (1982), states that conflicts occur "when there is a disagreement over values or scarce resources" and defines disputes as "an encounter involving a specific issue over which the conflict in values is joined" (quoted in Crowfoot and Wondolleck, 1990, p. 18). In reference to these definitions, it is noted that specific episodes or 'disputes' may be settled, but social conflict over nature's resources does not end. Conflict and dispute are used interchangeably in this dissertation.

EDR literature

Many published studies purport to document the effectiveness of EDR for social disagreements involving natural resource management. There are, however, some limitations with this literature. While partial theoretical frameworks for collaborative processes have

been outlined (Susskind and Cruikshank, 1987; Wondolleck, 1988; Gray, 1989; McMullin and Nielsen, 1991; Selin and Chavez, 1995), empirical work evaluating outcomes of collaborative processes is limited (O'Leary, 1995).

Much of the literature on EDR consists of case studies that are in the main anecdotal. The books and articles tend to focus on general EDR premises and processes, including the factors that promote successful processes, with descriptive treatment of specific cases. The authors are often EDR researchers or mediators who were in many instances involved in the cases cited and derive their conclusions from a combination of participation, facilitation, interviews and experience in the field. These authors are consequently sympathetic to collaborative approaches, and the literature they produce emphasizes the advantages of EDR. Few published studies involve critical or comparative case analyses, surveys, interviews or statistical evaluations of quantitative data. In many instances, authors do not disclose their methods of analysis or sources of data.

Most collaborative methods reported in the literature have been applied to site-specific disputes and their applicability therefore varies (Glasbergen, 1995). Studies are often considered successful if an agreement was reached, and in some cases if the agreement was implemented. Moreover, the focus of published studies has been principally on process and less on outcomes. Glasbergen (1995) states:

> When all parties, for the time being, are satisfied with the outcome of the process, which was aimed at consensus building, the dispute tends to be considered solved, irrespective of the eventual environmental consequences. ...the primary background to environmental disputes and the fundamental objective emanating from that background, the improvement of the physical environment, tends to drop out of the picture. (p. 14)

Potential drawbacks of collaborative methods

While claims about the benefits of collaborative EDR abound, some authors find reason for hesitation. Schneider and Tohn (1985) served on the project team of two EPA regulatory negotiation cases. These authors state that participants successfully reached consensus on a draft regulation. The parties in the process, however, did not waive their right to litigate after the final rule was established, leading Schneider and Tohn (1985, p. 67) to

acknowledge that "it is too soon to say negotiated rulemaking significantly reduces the likelihood" of cases being involved in litigation.

One of the most common claims made about EDR processes is that these approaches are cheaper and faster than traditional regulation and litigation. However, there is little evidence or data comparing litigation on environmental issues with environmental dispute alternatives to support these assertions (Bingham, 1986; Amy, 1987).

I found only one source that extensively examined the EDR process. Through a combination of literature, conferences, books and case studies on environmental mediation, and conversations with mediators and environmentalists involved with environmental dispute resolution, Amy (1987) systematically investigated the advantages and disadvantages of environmental mediation. While acknowledging the possible benefits of EDR, this researcher introduced three potential drawbacks of environmental mediation; 1) the congenial atmosphere may serve to disarm and co-opt environmentalists; 2) the possibility that the presence of superior political and economic resources could create imbalances of power that allows pro-development interests to elicit unfair concessions from environmentalists during the negotiation; and 3) the possibility that the process itself tends to redefine environmental issues in a way that favors pro-development interests.

Elaborating on the first potential drawback, Amy questions why many industry and government leaders are enthusiastic and supportive of EDR, while many environmental organizations remain skeptical of participating in such processes. Is it because business and government believe that collaborative methods are easier, faster and cheaper methods to achieve their goals, since after an agreement is reached there will be no further delays from litigation or other methods? Does the government use the participation methods as "therapy for the public to voice their concerns?" (Amy, 1987, p. 114). The author recognizes negotiating as a "sophisticated art," and that most industry and government representatives have experience with which to take novices, such as citizens or environmentalists, "to the cleaners" (Amy, 1987, p. 101). Amy notes that the informality, lack of structure and congenial atmosphere in EDR processes can allow unethical participants to exploit others. Moreover, while mediators are often third party professionals, it is in their best interest to create a collaborative environment to settle the dispute. Therefore, mediators could use

techniques and pressure tactics to "encourage parties to make concessions even when those concessions may not be in their best interests" (Amy, 1987, p. 108).

Regarding the second potential drawback, proponents of EDR recognize the importance of parties having relatively equal power. Amy notes, however, that there may be a critical difference between having some power and having enough power to extract significant concessions from one's opponents. He points out that money, scientific and legal expertise, and level of organization are sources of power, and large business, government and financial institutions, generally have more of this 'power' than environmental organizations or citizen groups. A determining factor frequently used to identify whether a group should participate in an EDR process is whether the group has enough power to block a final agreement. Because of this, the interests of politically weak groups may not be represented in EDR processes. Moreover, parties that have more 'power' and alternatives available in the event of failure have an advantage at the negotiation table. For example, an organization with more power can hold out for what it wants, leaving the other parties with less leverage to either accept the proposed agreement with a small gain or get nothing.

Finally, Amy raises the possibility that the EDR process itself can distort the nature of environmental issues in a way that favors pro-development interests. Some people assume that environmental conflicts are caused by misunderstanding and miscommunication, rather than by basic conflicts of interest; that environmentalists and businesses have different interests, but that the interests are not incompatible. EDR methods encourage parties to see all issues as amenable to compromise when some may not be. Amy points out that there is a difference between interests and values. Many environmentalists view conflicts as differences in moral, ethical and philosophical principles regarding how society should interact with nature. It is difficult to compromise on principles. Amy states that the purpose of courts, administrative agencies and legislatures is to establish and enforce certain societal norms and principles. He maintains that when environmental disputes are viewed as conflicts of interest, people assume that the purpose of the courts is to create peace between feuding parties, which can imply that EDR is a good substitute. He notes that peace and justice are different things and when EDR is substituted for litigation, peace may be promoted without justice being done or societal norms being upheld.

A common issue in environmental conflicts is development vs. non-development. For example, environmentalists may oppose a building or hazardous waste dump or drilling for oil in a national park. When EDR methods are used in these cases, after negotiation and compromise, developers are generally able to proceed with development after agreeing to certain safeguards to protect the environment. Amy states that environmentalists may see that type of negotiation not as neutral or desirable but as favoring development. The outcome that allows development is therefore not a real compromise but a victory for the developers.

Amy thus concludes that the problems in EDR processes can be viewed, not as abuses but as "political biases that are built into the process itself, systemic biases that tend to work in favor of some interests over others." The problems are embedded in the method, and the process automatically reproduces "the political imbalances present in larger political system" (Amy, 1987, p. 196).

While some practitioners and scholars tout the benefits of EDR processes and characterize collaborative decision-making as superior to conventional approaches, other authors recognize collaborative methods as an alternative method people can consider when involved in environmental conflicts. EDR should be viewed as a supplemental tool, rather than an alternative to litigation and other traditional approaches, that may or may not be more effective in particular circumstances (Bingham, 1986; Talbot, 1983; Susskind and Cruikshank, 1987). Gray (1989) states that cooperative approaches can expand society's capacity to create new options and agreements, but she acknowledges that traditional approaches remain important options because no one method is likely to be successful in all circumstances.

The Bureau of Governmental Research Service (1990) published a report with information to help stakeholders decide if the collaborative conflict resolution process is a viable alternative to conventional approaches such as litigation. The report identified eight factors that parties should analyze prior to selecting a resolution strategy (quoted in Mangerich and Luton, 1995, p. 250). The factors are:

1) The issues of the dispute can be clearly defined;
2) The issues do not focus primarily on constitutional rights;
3) The conflict involves several underlying interests, which allow room for negotiation;

4) Stakeholders are readily identifiable;
5) Each party can designate a spokesperson;
6) There is a relative balance of power between stakeholders;
7) The parties are likely to have continuing relations;
8) It is likely that a realistic deadline will be set.

Factors Affecting the Success of the Collaborative Process

Overview

Practitioners and scholars have identified several factors that contribute to the success of a collaborative approach to conflict resolution. Who participates in the collaborative effort greatly affects the success of the process. The parties who have an interest or stake in the outcome of an environmentally related conflict should be involved in the process. Since participating in EDR is voluntary, the timing of the collaborative effort can be a crucial factor in getting people to participate. Moreover, actors must be motivated to participate in the process and believe that they will gain more from collaborating than through an alternative approach. Since environmental conflicts generally involve multiple parties and diverse interests, mediators frequently play important roles in convening parties and facilitating the process.

An important aspect of EDR success is that participants jointly create the structure by which they will operate during the collaborative process. Developing procedures and ground rules by which all the participants abide during the process helps ensure that all actors are treated equally and fairly. How parties will interact with the media should be included in the rules. Establishing common goals and objectives, and generating a common definition of the problem builds understanding and interdependence among stakeholders and guides productive communication. Environmental conflicts generally involve scientific uncertainty and technical information that can be incomplete or contradictory, and parties frequently have different sources of data. Jointly gathering and examining relevant data provides information that is credible to all parties and furnishes a common base for discussion and decision-making. Before making a decision, authors suggest that parties brainstorm to create numerous options that consider short-term and long-term issues. Consensual decision-making is generally encouraged. Once an agreement has been reached, authors generally encourage parties to establish the covenant in written form. The document should include the details of

the agreement, as well as whom, when and how the agreement will be implemented and monitored.

As indicated earlier, the major findings presented in the literature consist of a combination of information ranging from specific case studies to broader knowledge gleaned from an author's experience. Therefore, the source of information from which authors base their conclusions is included with each reference cited. Moreover, the terms *actors*, *stakeholders*, *parties* and *participants* are used interchangeably in the following sections.

Inclusivity

Not surprisingly, there is consensus among authors that parties substantially affected by the outcome of an environmental dispute, the stakeholders, should be involved in the EDR process. Stakeholders are individuals, groups and organizations with a perceived interest or stake in an outcome, or having the potential to impact a particular resource (Wood and Gray, 1991; Selin and Chavez, 1995). Bringing the key stakeholders to the same table encourages communication and as a result, helps the group establish a comprehensive understanding of the problem. However, during the process, care should be taken that certain interests do not dominate discussion (Gray, 1989, based on a decade of experience). Wondolleck, (1985), examined several cases involving national forest planning and found that when stakeholders are active in determining the outcome, they have greater support in the final agreement.

A common concern shared by those involved in collaborative efforts is whether the initiative is inclusive of the key stakeholders. Parties who are excluded may later undermine an agreement (Bingham, 1986, based on 161 cases; Gray, 1989, decade of experience). Basing their views on a decade of experience and research in mediation at the Public Dispute Program at Harvard Law School, Susskind et al. (1987) concluded that any party having the power to obstruct or delay implementation of a decision should be included in the collaborative decision-making process. An excluded party may demand changes to the final agreement or attempt to block its implementation. In a case, described by Crowfoot and Wondolleck (1990), involving citizen groups and a state agency official, a county representative who had authority over property that was part of the dispute was not included in the decision-making process. After the parties reached an agreement, the county official

blocked its implementation. As a result, the initial parties had to undertake an additional six months of meetings with the county representative to resolve the issue.

Before the EDR process can begin, two issues must be resolved: what interests or stakeholder groups should be represented, and who should represent the group. Disagreement about who should be involved in the process can arise among interest groups. Having 12 years experience in collaborative problem solving, Gray (1989) found that parties who have been involved in heated issues prior to the inception of a collaborative process may perceive that the opposing side will not listen or should not be involved in the process. Gray states that collaborative efforts should include people with the perceived right to participate in the process, those impacted by the conflict's outcome and who become involved in order to moderate those impacts. In addition, she notes that stakeholders must also have the capacity to participate; they must possess resources and skills sufficient to justify their involvement. After years of experience in the EDR field, Carpenter and Kennedy (1988) state that the person organizing the participants should find people who are knowledgeable about the subject matter, representative of their interest group and able to interact with other actors in a respectful manner. Based on two cases involving wilderness designation in Idaho, Baird et al. (1995) report that negotiations can be limited or may collapse when stakeholders are not prepared, when they lack knowledge of the area and applicable laws or when parties do not have mandates from their constituent organizations. Susskind and Cruikshank (1987, decade of research and experience) maintain that it is not always obvious which individual or organization should represent a particular interest. Therefore all possible groups should be contacted. Preliminary contacts can serve as a bridge to other people who might be able to suggest representatives of a certain interest.

Environmental conflicts are generally between groups and agencies, not individuals, and therefore stakeholders often represent organizations, agencies or interest groups. Several authors claim that a critical aspect of convening stakeholders and increasing the likelihood of reaching an agreement is to ensure that parties are representative of their specific groups, have respect and support from their constituencies, and are empowered to speak and make decisions for the group's interests (Wondolleck, 1988; Susskind et al., 1987; Susskind and Cruikshank, 1987, decade of research and experience; Dotson, 1983, three housing and

shopping center cases). While it may not be easy to identify all of the affected parties in a conflict or determine how they can be represented effectively, nominations from stakeholder groups that represent many people often prove favorable for successful collaborative efforts (Chrislip and Larson, 1994, based on research of 52 case studies). Nominations from constituents help the EDR organizer ensure that representatives have support and approval from the organization.

In their analysis of seven cases, Crowfoot and Wondollect (1990) state that citizen groups should make sure their representative knows the organization's concerns and objectives regarding the issue to be discussed, what the organization hopes to accomplish by participating and how communication be maintained with the constituents. The authors report that in one of their cases, a citizen representative commented that through the combination of "growing to like the people" and the momentum of reaching a consensus, participants can lose sight of their initial goals and objectives.

Several authors express the importance of representatives keeping constituents or organizations apprised of the collaboration processes, procedures and agreements (Bingham, 1986, 161 cases; Susskind et al., 1987, decade of experience and research in mediation). Dotson (1983) described a dispute between neighbors and a landowner who wanted to develop his land and thought his neighbors should not be meddling in his affairs. The landowner chose not to participate in the negotiation process but had his attorney represent him in the process. After the parties reached an agreement, however, the landowner refused the agreement, dismissed his attorney, and pursued litigation with a new lawyer. The attorney representing the landowner in the EDR process did not maintain good communication and understanding with the landowner during the process and therefore the case failed. This case led Dotson to stress the importance of communication.

At the outset, parties should clarify the degree of their representation and their authority to make decisions and speak for their constituents. To increase the likelihood of successful collaboration, participating stakeholders should understand the different forms and limits of each representative's decision-making authority (Manring et al., 1990, experience in EDR field; Susskind and Cruikshank, 1987, decade of research and experience). Some representatives may be able to speak openly and make decisions for their organization,

whereas other parties may need to check with organization members first (Crowfoot and Wondolleck, 1990). Including decision-makers is encouraged, because the failure to include stakeholders with the authority to make and implement decisions can greatly reduce the likelihood of success in reaching and implementing an agreement (Bingham, 1986, 161 cases; Gray, 1989, decade of experience). Based on 52 case studies, Chrislip and Larson (1994) concur. In her study of site-specific disputes, Bingham (1986) reports that implementation of agreements increased from 67 percent to 85 percent when an individual with the authority to implement a decision participated in the process from the beginning. Including public agency employees with authority builds trust in the collaborative group's efforts to make decisions and implement projects by circumventing the need for government representatives to return to the agencies for direction (Bingham, 1986; Wondolleck, 1988). Moreover, parties are more likely to participate if there is "visible support" from well-known and respected community leaders (Chrislip and Larson, 1994, based on research of 52 case studies). The support and participation of community decision-makers provides credibility and helps assure stakeholders that the process may produce tangible results.

Interest groups may have difficulty identifying a representative to participate in the EDR process. If an interest group is not specifically organized, the parties can nominate a surrogate to represent them, or may establish a group organization to participate in the collaborative process (Susskind and Cruikshank, 1987, decade of research and experience). Moreover, in certain instances where organizations or coalitions have difficulty identifying one person to represent their interest, it may be useful to rotate designated spokespeople. The authors maintain that this helps ensure that the interest group is represented and that splinter groups that feel inadequately represented do not break away from the larger group and attempt to block implementation of the agreement. Susskind and Cruikshank (1987) state that alternate representatives can be useful during specific rounds of discussion, for example when technical or scientific issues are being discussed and a certain participant may have better knowledge or background in that area. Baird et al., (1995) basing their views on two cases involving wilderness designation in Idaho, state that in order to have a 'manageable number' of participants, some parties may represent two or more similar but distinct groups.

In this instance, actors may agree on general premises but may differ on details. Therefore, the challenge of keeping the constituency informed is underscored.

Participation is voluntary. Citing evidence from three cases involving housing and shopping center disputes, Dotson (1983) states that if a person hesitates to participate, the mediator could encourage that person to observe the process, and that over time the actor may decide to participate. Crowfoot and Wondolleck, (1990) argue that if a key stakeholder chooses not to participate, the other parties can 1) ensure that the nonparticipant's interests will be represented by other actors, 2) develop an acceptable alternative to the collaborative process, 3) discontinue the EDR process and pursue other options, or 4) develop strategies to encourage the missing party to participate. If the process continues without the stakeholder, the unrepresented interests should be kept abreast of the issues and progress of the EDR process. Crowfoot and Wondolleck describe a case in which an industry representative declined an invitation from citizen groups to participate in an EDR process, and instead preferred to let government officials resolve the conflict through the traditional decision-making process. While collaborating with the citizen groups, an agency official communicated the issues and progress to the industry stakeholder during the process. The group reached an agreement, and the industry representative accepted the agreement.

Government agency representation

Environmental conflicts frequently involve local, state and federal government entities, and consequently it has become more common for government officials to be participants in collaborative conflict resolution efforts. Bingham (1986) examined 161 EDR cases and found that government agencies were involved in 82 percent of those cases. Dotson (1983), after examining three cases involving government agencies, states that participation of government officials can play a key role in legitimating the collaborative process for other stakeholders. Because public agencies and the resources they manage are often a component of environmental conflicts, parties may view agency participation as pertinent and crucial to the decision making process. Moreover, without government representation, stakeholders may not know which options would be acceptable to the agency (Harter, 1982, 60 case studies).

Government representatives can contribute to the collaborative process in several ways. Wondolleck (1985) examined case studies of national forest planning and found that the most valuable impact government officials can have is not so much in determining a final outcome, but in determining how decisions are made, who is involved, how issues are framed, what information is used, how alternatives are created, analyzed and evaluated, and how implementation occurs. In addition, government employees may have access to information or other resources that may help the participants save time and resources (Harter, 1982, 60 case studies). Perritt (1986), basing his observations on an examination of four rulemaking negotiations, maintains that collaboration can be successful in government rulemaking proceedings.

One of the biggest challenges government agencies confront is not necessarily managing resources but pleasing the public whose resources they are entrusted to manage. Traditionally public resource managers based decisions on a combination of scientific information, economic progress, political guidance and other factors (Wondolleck, 1988; Mangun, 1992; Nelson, 1995). Since the environmental movement of the 1960s and 1970s however, the public has become more vocal in wanting to participate in the decision-making processes involving public resources (Wondolleck, 1988; Mangun, 1992; Nelson, 1995). Thus, collaborative methods have proven useful to government resource managers. In an evaluation of four EDR cases involving the USFS, Wondolleck (1985) states that the USFS was able to engage in collaborative EDR processes and continue to make a decision guided by professional expertise and based on scientific management principles, while including stakeholders in developing and assessing alternatives. Moreover, the groups were able to reach agreements that all of the parties supported. Collaborative decision-making can yield positive outcomes between different government entities. Dotson, (1987) basing his conclusions on experience gained at the Institute for Environmental Negotiation, maintains that environmental mediation can be particularly useful in disputes between and among government agencies because parties have some common interests, such as serving the public interest.

On the other hand, government officials may hesitate to participate in collaborative processes or face constraints that limit their participation. Based on empirical evidence from

a study of nine cases, Sachs lists ten obstacles to federal agencies use of EDR methods: 1) agencies have no funding for collaborative efforts, 2) the agencies are themselves partisan or fear the perception of appearing partisan if the agency funds a mediation process, 3) officials do not understand the process and feel the information available is inadequate, 4) the process mechanism is not yet apart of agencies' regular decision-making processes, 5) federal officials fear the mediated settlements could be challenged under the Administrative Procedures Act and government attorneys think that participation could weaken an agency's position in court, 6) lack of precedents or case histories to justify decisions, 7) government officials perceive EDR processes as encompassing more work, less control, legal challenges and high risks, 8) lack of support from the highest echelons of the agency, and 9) the challenge of working across jurisdictional lines (Sachs, 1982, p. 97). In addition, Wondolleck (1985) examined case studies of national forest planning and found that officials often lack the skills and techniques to effectively participate in the EDR processes, and that some agency employees receive resistance from colleagues who prefer to operate in the traditional manner. Based on experience in forestry, Selin and Chavez (1995) report that public resource managers who are used to hierarchical decision-making may find the lateral decisions needed for effective collaboration challenging. It may not be appropriate for government officials to participate if they are unwilling to give up power (Dotson, 1983, based on three case studies). If government officials are not legally permitted to participate, a staff person may be present during the process to represent the agency (Susskind et al., 1987, decade of experience and research).

After examining nine cases, Wood and Guy (1995) identified four key strategies for local governments to use to increase the likelihood of EDR success in environmentally sensitive projects: local governments should 1) identify stakeholders early in the planning process, 2) have a central contact person to serve as a liaison to stakeholders, 3) be sensitive to environmental concerns and 4) ensure timely and effective communication with interested parties.

Motivation and timing

There is no general agreement as to how the timing of a collaborative approach affects stakeholder participation and in turn, the success of the process. Based on six case

studies, Talbot (1983) says that collaborations are often initiated when conflict has matured to a point where the issues are defined and the parties believe that their individual interests cannot be achieved alone. The issues must be readily apparent and the participants must be ready to address them (Harter, 1982, 60 case studies). Susskind and Cruikshank (1987, decade of research and experience) maintain that generally stakeholders will not enter into collaborations until after a conflict has "erupted." In contrast, Gray (1989, p. 55) notes that in the initial stages of the EDR process, parties with a "shared vision concerning the problem" may be more willing to participate than those who are "embroiled" in conflict and have no common definition of the problem. However, Gray states that parties often agree to participate only as a "last-ditch effort," when other methods have reached an impasse or have produced less than acceptable outcomes. Based on years of experience Susskind et al. (1987, p. 128), have found that EDR can be successfully used after disputes have "erupted" or to "preempt disputes before they emerge." However, there are "trade-offs." The authors state that in the early stages of the conflict, parties may be less rooted in their positions and more willing to negotiate, but at the same time, the actors may not accurately understand the relevant issues and have little incentive to resolve the problem. On the other hand, in the later stages of a conflict, stakeholders may have better knowledge of the issues and already have invested time and money in the conflict, and therefore have more incentive to resolve the issue.

Parties have little motivation to participate if they believe that they can prevail by following conventional decision-making processes. Therefore, stakeholders must be motivated to participate in the process and believe that they will have an opportunity to pursue their individual interests (Gray, 1989; Bingham, 1986; Carpenter and Kennedy, 1988). In addition, stakeholders should perceive that their interests are interdependent and that a unilateral solution to the problem would impede their progress (Wood and Gray, 1991). People are more likely to participate in a collaborative process if they believe the outcome will advance their interests and produce better results than an alternative method (Priscoli, 1987, evaluation of two cases; Gray, 1989). However, parties will be unlikely to participate, let alone reach an agreement, if they believe they could achieve more by using another method (Bingham, 1986). Motivation to participate may be the belief that an agreement will

be implemented or that there are opportunities for mutual gains that would be unavailable except thorough collaboration (Bingham, 1986). Actors may not participate if the parties perceive the process will undermine or weaken their position (Nash and Susskind, 1997, based on a case involving a municipal solid waste siting).

In his examination of three land use cases, Dotson (1983, p. 203) found that some actors are motivated to participate in a collaborative process as a result of "pressure imposed by a less desirable but viable alternative" and "the amount of time before that alternative is activated." In one case involving land use issues, a developer made several concessions to appease the opposing parties, however the neighbors continued to object and the town council denied a use permit. As a result, the developer stated that he would pursue litigation and reinstate the concessions in his original development plan. After realizing the developer would likely win the case, the town council and neighbors sought a mediator to initiate negotiations between the parties. All parties agreed to participate in the process and soon thereafter reached an agreement in which all were satisfied.

Equality between stakeholders

Unequal power between players can impede EDR success. Parties may be reluctant to participate if they perceive that they are at a disadvantage to represent their interest or if they believe their interest will be deemed secondary to more powerful ones (Gray, 1989). An important aspect of EDR is that the process is generally not hierarchical, nor does it rely on systematic selection processes to establish leadership and coordinate action. Instead, the approaches tend to utilize more horizontal systems of association, interaction and communication to organize, make decisions and mobilize resources (KenCairn, 1996). After analyzing two cases, Priscoli (1987) reports that actors might not have accurate perceptions of each other's power, but the fact that parties are working collaboratively and making decisions consensually helps equalize power by giving each person an equal say in the outcome. Equal power within groups and shared management and decision-making authority contributes to successful resolution processes (President's Council on Sustainable Development, 1997, review and synthesis of several collaborative processes).

Number of people involved

In EDR, a large number of participants can have successful outcomes, however, big groups can increase the challenge of discussing issues and reaching agreement. It is important to make sure all interests are represented. Susskind and Cruikshank (1987, p. 101) maintain that it is better to include too many participants than too few, "especially at the outset," so that parties do not feel excluded. Citing evidence from 52 case studies, Chrislip and Larson (1994) agree. Basing their views on an analysis of three watershed partnership case studies, Toupal and Johnson, (1998) concluded that the process should include a wide variety of people and as many partners as possible.

Some dispute resolution experts have found that limiting mediation processes to 15 or fewer participants may increase the likelihood that the desired parties will participate (Priscoli, 1987, two cases; Nash and Susskind, 1987, case studies of municipal solid waste incineration). After reviewing a municipal waste location case, Nash and Susskind report that sending special invitations to stakeholders and limiting the number of parties involved increases the likelihood that the desired actors will participate in the process. From years of experience in the EDR field, Carpenter and Kennedy (1988, p. 103) learned that eight to twelve people is a "good working size," but larger groups might be more appropriate when complex issues and a diversity of interests are involved. The same authors acknowledge however, that larger groups require more time to reach agreements and schedule meetings. In a review of 161 cases, Bingham (1986) maintains that the likelihood of reaching an agreement is not clearly affected by the number of parties involved. Priscoli (1987) found similar results in his evaluation of two case studies of wetland fill and hydrocarbon exploration.

Several authors maintain that small working groups are useful when large numbers of stakeholders are involved. Gray (1989), with twelve years of EDR research and experience, suggests splitting parties into subgroups when the number of stakeholders surpasses 12-15, or when there are several issues and tasks to be accomplished. Subcommittees or working groups are useful in complex disputes, as long as at least one person from each interest group is represented in each subcommittee (Susskind and Cruikshank, 1987, decade of research and experience; Crowfoot and Wondolleck 1990, analysis of seven cases).

Moreover, if there are heated discussions, a facilitator should be used. In four cases analyzed by Crowfoot and Wondolleck (1990), the participants successfully used working groups to collect background information and produce the first draft agreements. The authors recommend that care should be taken so that members of a larger group are not pressured into accepting a draft proposed by a subgroup if a participant thinks there should be changes, because the final agreement should be amenable to all representatives. In one instance, Crowfoot and Wondolleck report that two actors who were not in a subgroup disagreed with certain aspects of a first draft but felt pressured to accept the document as the final agreement because of the time and effort that were invested in it. Subgroups can be useful, but individuals should retain the option to disagree with work developed without their input and to ask for changes.

Mediators

Many EDR cases involve a third-party mediator who assists in facilitating and advancing collaborative efforts. A mediator is generally an impartial third party who assembles stakeholders, and assists parties in communicating effectively, analyzing the dispute, designing a strategy and developing a mutually acceptable agreement while advancing individual interests (Burgess and Burgess, 1997b; Carpenter and Kennedy, 1988; Dotson, 1983, 3 cases). The mediator does not have the authority to make a decision or impose a solution. Mediators must be someone whom the stakeholders trust, and who is able to establish an atmosphere of trust in which stakeholders feel comfortable to discuss issues (Gray, 1989).

There are a number of EDR organizations that provide mediation services (for a list of organizations and mediators, see Bingham, 1986). In the United States, several colleges and universities have developed courses, programs, and training in environmental dispute resolution and mediator skills. For example, Harvard Law School and Massachusetts Institute of Technology offer programs in which students can specialize in EDR. After deciding to employ a mediator, the group should interview potential third parties. Characteristics that authors suggest groups consider include 1) impartiality, 2) conflicts of interest, 3) competence, 4) confidentiality, 5) fees, and 6) personal and procedural credibility (Burgess and Burgess, 1997b; Carpenter and Kennedy, 1988). Gray (1989) mentions that mediators

with characteristics such as empathy, patience and self-assurance can help build trust with stakeholders.

In their analysis of seven cases, Crowfoot and Wondolleck (1990) state that the stakeholders involved in the process felt the mediator played a crucial role in leading the process and educating parties who were unfamiliar with the process. In their opinion, a good facilitator can help minimize "power plays and politics" and ensure equitable participation in collaborative process (1990, p. 88). From a decade of experience and research in EDR processes at the Public disputes Program at Harvard Law School, Susskind et al., (1987) concluded that a mediator is especially helpful in cases with numerous stakeholders and diverse interests.

Convening opposing parties is a useful task often filled by mediators. In analyzing two cases, Priscoli (1987) reports that the local public had a general dislike and distrust of the U.S. Army Corps of Engineers, one of the stakeholders involved in both cases. Consequently, public and environmental groups were reluctant to participate in an EDR process. However, after discussion with a mediator, the hesitant parties agreed to participate. As a result of the process, the parties not only gained a better understanding of each other's interests and reached an agreement, but after the process, the public had an improved perception of the U.S. Army Corps of Engineers.

Recognizing that in some instances it is impossible to include every person and interest in a process, Gray (1989) maintains that mediators can be useful in organizing interest groups and overseeing the size and manageability of the parties. With over 12 years experience in collaborative problem solving, Gray suggests that parties allow flexibility in the process so additional members may be added if necessary. When there are a large number of participants, mediators can assist in facilitating the overall group and its attendant subcommittees. Schneider and Tohn (1985) concluded from their participation in two EPA cases, that when large committees are convened, the process can be more effective if there is a head mediator and a team of assistant mediators to work with smaller working groups. The assistant mediators generally facilitate discussion in the subcommittees.

Structure and process

How an EDR process is structured is a critical factor in the success of the EDR process. The first question those confronted with complex and controversial problems should ask themselves is 'How shall we approach this?' and not 'What should we decide?'; parties should focus first on the process and less on the outcome (Wondolleck, 1985, decade of experience and case studies, 342). Wondolleck reports that focusing on the process, raising such questions as 'Who should be involved?' and 'What information do we need and how can we get it?', encourages creative and collaborative problem-solving among the parties and assists actors in reaching an acceptable agreement. By contrast, focusing immediately on the outcome can limit discussion and ideas.

A basic premise of successful collaboration is trust between stakeholders and trust in the process (President's Council on Sustainable Development, 1997, review and synthesis of several collaborative processes). Citing evidence of 52 case studies, Chrislip and Larson, (1994) agree. Trust takes time to establish, but it provides a foundation for parties to discuss their needs and interests and to build open relationships (Allen et al., 1998, experience and case studies; Dotson, 1983, three housing and shopping center cases). Allowing participants to create the structure and process helps build trust between the members and in the process.

Establishing the process and procedures

Several authors underscore the importance of allowing stakeholders to collaboratively design and shape the process and procedures by which they will attempt to resolve problems, including, what will be discussed, what information will be needed, how decisions will be made, and how resources will be allocated (Carpenter and Kennedy, 1988; Bingham, 1986; Susskind and Cruikshank, 1987; Murray 1993; President's Council on Sustainable Development, 1997; Allen et al., 1998). The authors maintain that this effort gives stakeholders more ownership and greater participation in the process, and builds positive working relationships that help improve communication, decision-making and project implementation. Carpenter and Kennedy (1988) note that parties are more likely to accept a decision when they are able to participate in the resolution of an issue. In addition, this method can develop behavior that will later benefit the parties. Besides building credibility in the process, establishing ground rules by which all parties abide helps ensure that all actors

are treated equally and fairly (Chrislip and Larson, 1994, analyzed 52 case studies; Carpenter and Kennedy, 1988, decade of experience in the field).

Basing their views on years of experience in the EDR field, Carpenter and Kennedy (1988) note that parties should mutually decide the ground rules and procedures the group will follow. They referred to one instance in which a group did not establish an overall plan, resulting in a failed process because members began arguing about issues and specific components of the problem before identifying individual concerns and defining the problem. In their analysis of seven cases, Crowfoot and Wondolleck (1990) states that in two cases participants did not establish ground rules and procedures for the process, and as a result the actors were not as effective in participating because the parties did not understand the procedures. In another five cases, the ground rules were structured and clear from the beginning, and the parties had a "good foundation" to participate. Susskind and Cruikshank (1987, decade of research and experience) told of one case in which the stakeholders did not establish ground rules but addressed specific procedural questions as they arose. The authors note, however, that such an approach rarely works in complicated cases.

Carpenter and Kennedy (1988, p. 93) gleaned from their experience that there is certain criteria that should be included a group's procedures. The authors maintain that parties should consider creating ground rules for, 1) finding a common definition of the problem, 2) determining agreeable procedures, 3) developing options for solving the problem, 4) identifying individual interests and concerns, 5) reaching an agreement, and 6) deciding how agreements will be implemented. Finally, the plan should serve as a "preliminary blueprint" that provides direction, but which is flexible and can be modified as the process continues.

Establishing an adaptable plan contributes to the effectiveness of the group. Collaboration is an emerging characteristic that evolves in response to internal and external factors. Therefore stakeholders should create a flexible process that is designed to grow and change to meet their needs (Selin and Chavez, 1995, experience; Allen et al., 1998, experience). A flexible process encourages creative solutions to problems and builds reciprocity by acknowledging individual concerns and heightening the willingness of parties to accommodate to each other's interests (Susskind and Cruikshank, 1987; Gray, 1989, both

decade of research and experience). Basing their views on an analysis of three watershed partnership case studies, Toupal and Johnson, (1998) agree.

Effectiveness of participation

Discussing and outlining acceptable and unacceptable behavior for stakeholder interaction can build confidence among parties and set the stage for the remaining process (Gray, 1989, over 12 years experience in collaborative problem solving; Fisher and Ury, 1981, experience and theory). Based on a decade of experience and research in mediation at the Public disputes Program at Harvard Law School, Susskind et al. (1987, p. 132) agree that stakeholders should establish ground rules to guide discussion, and therefore developed a list of factors that should be addressed. The ground rules should include:

- Who serves as spokesperson
- Rules of confidentiality
- Procedures for dealing with media
- Tasks to be performed by mediation and technical staff
- Procedures for documenting the negotiations
- Procedures for organizing negotiations sessions
- Rules for private caucuses or meetings between formal negotiation sessions

The collaborative process can assist participants in separating people from problems and interests from positions. This distinction allows parties to focus on the problem and the interests that underlie the positions. Fisher and Ury (1981), based on theory and years of negotiating experience, state that when actors set aside positions and focus on the problem, the parties are more likely to uncover shared and compatible interests. In turn, this helps stakeholders uncover opportunities for mutual gain and provides a basis for creating new options to resolve the conflict (Fisher and Ury, 1981, research and experience; Dotson, 1983, three cases; Bingham, 1986, 161 cases; Priscoli, 1987, two cases; Susskind and Cruikshank, 1987, decade of research and experience). Carpenter and Kennedy (1988) maintain that lasting solutions are based on interests rather than positions.

When two contesting individuals are attached to their position, and therefore discuss and think about advancing their position rather than their interest, the process can yield an impasse. As an example, Fisher and Ury described a case of two people arguing in a library – one person wanted the window open and the other individual wanted the window closed. The

two parties could not agree on the status of the window. The librarian came and asked the one actor why he wanted the window open, and the person remarked, "To get some fresh air." She asked the other party why he wanted it closed, and he states, "To avoid the draft." The librarian resolved the problem by opening a window in the next room, which allowed an influx of fresh air without a draft. Basing their views on experience in the field, Carpenter and Kennedy (1988, p. 129) report that once parties are able to set aside their positions and discuss their interests, they frequently discover that the interests are "different but not mutually exclusive." Upon this realization, actors can find starting points to solve the problem.

While differences between interests may be mediable, authors state that agreement is unlikely in cases that involve conflicts of values or moral judgments about absolute right or wrong (Susskind et al., 1987, decade of experience; Painter, 1988). While acknowledging this view, Priscoli (1987) described two case studies in which parties were able to define shared interests and reach agreements without compromising their basic values. Priscoli found that the environmental groups, public resource management agencies, and developers involved in the two EDR processes were able to maintain their fundamental values and produce an outcome that not only pleased the participants but also satisfied local community members.

Media

Media representatives naturally want to cover controversial issues, however, their presence and actions can affect participation and the success of a collaborative process. After years of experience and research in EDR processes, Carpenter and Kennedy (1988) found that actors might not be as open to exploring and discussing various options when the media are present. Citing evidence from seven case studies, Crowfoot and Wondolleck (1990) suggest that early in the collaborative process groups should decide how to handle the press. In two cases, the media were not allowed into meetings but could interview parties after meetings. In other instances, stakeholders provided information about the conflict and its progress to the press, and after an agreement was reached, the group informed the media of the settlement. Baird et al. (1995) basing their views on two cases involving wilderness designation in Idaho, recommended that parties should determine whether the media will be

allowed access to collaborative proceedings and how or whether stakeholders will communicate with the press while participating in the process. In one case, actors successfully used the media as a political resource to draw attention to a controversy.

Processes and procedures

Common goals and objectives

Establishing mutual goals and objectives assists in the progress and success of the collaborative process. Stakeholders should jointly establish common goals and objectives at the beginning of the process (Gray, 1989 12 years experience; Nash and Susskind, 1987, solid waste siting case; Allen et al., 1998; decade of experience; Toupal and Johnson, 1998, three watershed partnership case studies). Defining a shared vision and mutually agreeable objectives can be a unifying factor in project ownership and can serve as a focus that will guide the process (President's Council on Sustainable Development, 1997, review and synthesis of several collaborative processes; Crowfoot and Wondolleck, 1990, seven case studies).

Whether people perceive their goals are cooperative, competitive or independent affects the dynamics and outcomes of conflict (Deutsch, 1973, 1987, based on years of experience and research). Parties who believed they were working for mutual benefit, expressed their views, tried to understand each other and integrated their ideas to resolve conflicts (Tjosvold, 1990; Deutsch, 1973). In addition, participants developed confidence that they could work constructively with each other in the future. Although collaboration can imply interdependence, the process of establishing common goals can raise awareness among stakeholders that their interests are intertwined and that together they can produce outcomes that they could not achieve independently (Gray 1989, 12 years experience; Tjosvold, 1990; Nash and Susskind, 1987, municipal solid waste location case).

Joint fact finding

Environmental controversies frequently involve scientific uncertainty and technical data that is often incomplete or contradictory. Moreover, parties often have different sources or interpretations of this information, and can therefore disagree on the facts and potential risks of an action (Bingham, 1986, 161 case studies; Smith, 1987, 10 years experience as public resource manager; Richman, 1987, years of EDR experience). Carpenter and Kennedy

(1988, p. 54) state that one of the first principles to address in EDR processes is that "to find a good solution, you have to understand the problem." Likewise, to collaborate and comprehend the problem, parties should agree on the information that will be used.

Technical and local knowledge

With the diversity of data and technical information involved in environmental disputes, stakeholders often have a challenging time understanding, assimilating and discussing relevant information. Therefore, inviting people with expertise to help interpret and explain information can help stakeholders develop a common understanding of the data. Crowfoot and Wondolleck (1990) analyzed seven EDR cases and report that citizen representatives often felt they did not have equal access to certain information or did not have the expertise to fully understand and apply the information. In these instances, parties recruited individuals with expertise to help the members understand and clarify data at the meeting. In turn, this measure gave the environmental and citizen groups additional credibility in the negotiations and strengthened the group. This process helped the members not only to reach an agreement, but also to incorporate "sophisticated environmental solutions" (Crowfoot and Wondolleck, 1990). Basing her views on over 12 years experience in collaborative problem solving Gray, (1989) found that a panel of technical experts at a meeting can help stakeholders to better understand information and reach an agreement on technical facts. Nash and Susskind (1987, solid waste location case) warned that involving technical experts who have divergent views on the information could confuse participants and impede the consensus building process. Participants should choose consultants carefully, and may need to discuss the process with the consultants a priori.

It is common in environmental conflicts for parties to want more information or to have information that conflicts with that of others. In such instances, Susskind et al., (1987, p. 133, decade of experience and research) found that information from a neutral third party or previously recognized source can prove beneficial. However, the authors mention that new data can "exacerbate the apparent conflict" if the new information tends to favor the preferred outcome of one party and not of the other. In addition, too much data can discourage stakeholders. In their study of two cases involving wilderness designation in Idaho, Baird et al., (1995) said that one case failed because parties were overwhelmed with

the multitude and complexity of issues, many of which extended beyond the original negotiating framework. Therefore parties may want to isolate specific issues to address, and exclude extraneous information.

Traditionally, natural resource decisions were based primarily on policy and expert knowledge from the scientific community. Environmental conflicts frequently involve ecological, social and economic issues, and local people can contribute useful information regarding these issues (Allen et al., 1998; decade of experience). Decisions made using collaborative methods frequently involve both the scientific and local community in gathering information on issues, concerns and solutions. This approach merges scientific knowledge with local knowledge and provides not only a broader wealth of information, but empowers citizens at the local level and increases ownership in decision making and the likelihood of an agreement being implemented (Gray, 1989, 12 years experience; Carpenter and Kennedy, 1988, decade of experience; Warren, et al., 1995).

In conclusion, Carpenter and Kennedy (1988, decade of experience as leaders in EDR processes, p. 89) state that participants should remember that conflicts are a mixture of "procedures, relationships and substance." Therefore, while attempting to resolve a dispute, participants should not resolve the issue solely on technical information, but should give equal attention to human concerns and the procedures used to reach an agreement.

Jointly defining problems

Establishing a common definition of the issues and concerns involved in the problem potentially heightens progress between stakeholders. Environmental conflicts are generally complex and involve several issues and interests. Having a common definition of the problem helps participants see that their interests are interdependent and desired outcomes are linked to the actions of others stakeholders. During the initial stages of the process, stakeholders should allow time for each person to explain their perceptions of the problem, issues and concerns so parties know that each of the other members has heard their perception of the problem (Carpenter and Kennedy, 1988, decade of experience). Gray (1989 decade of research and experience) and Susskind and Cruikshank (1987, decade of research and experience) concur. Discussion can help identify and clarify different perceptions of terms, a potential barrier to understanding. Gray (1989) describes a case in which two experts

on a collaborative National Coal Policy Project had antithetical perceptions of coalmines. The two individuals, one from the East Coast and the other from the Rocky Mountain region, had images of coalmines that differed in size, scale, overburden and reclamation process, and therefore were talking about different things.

In their analysis of seven cases, Crowfoot and Wondolleck, (1990) found that parties were most successful when they defined the issues according to 1) the parties' authority over the outcome, 2) what the parties considered to be negotiable, and 3) what problem-solving was possible given the available time and information. For example, in a case involving local citizens and the U.S. Forest Service (USFS), the Forest Service representative stated at the outset that wilderness status for the area in dispute was nonnegotiable because only Congress could determine wilderness status.

The agenda should be inclusive of all the concerns and interests, but yet not too broad or narrow. A broad agenda may seem overwhelming and the discussion of issues can be superficial. However, if an agenda is too narrow, there may not be enough items for participants to negotiate (Susskind and Cruikshank, 1987, decade of research and experience). Moreover, if parties perceive the agenda does not reflect their interests or if the definition of the problem is not acceptable to some actors in the group, the actors may have less incentive to participate and could attempt to block the process (Gray, 1989 decade of research and experience). Basing their views on a decade of experience and research in mediation at the Public Disputes Program at Harvard Law School, Susskind et al., (1987, p. 134) note that agreeing to an agenda can involve "intense debate" if parties attempt to "include or exclude issues of special concern." In establishing the issues and agenda, Crowfoot and Wondolleck (1990) suggest that parties place the most important or critical issues at the top of the list. The authors analyzed seven EDR cases and report that toward the end of the process some issues were rushed or completely dropped. Consequently, some participants were not pleased with the final agreements because some of their principal concerns were not addressed.

Establishing a common base of information

To define problems and create solutions, parties need to understand and agree on relevant information. Instead of wasting time on arguing about whose facts are correct,

authors suggest that committees establish a set of mutually acceptable data from which to make decisions. Collaborations generally involve 'joint fact finding' to establish a common base of information. Jointly gathering and examining data provides information that is credible to all parties and can propel parties into discussing the information and better understanding each other's interests (Susskind et al., 1987 decade of experience and research; Gray, 1989, Priscoli, 1987, two cases). Mutually examining relevant data can help parties develop a common basis for discussion and help actors uncover how the information corresponds with their interests and opinions. Gray (1989, p. 82) states "joint research helps parties evaluate the relative weight to give to their own position and in some cases prompts parties to change their opinion on an issue." Drawing on over a decade of research and experience, Susskind and Cruikshank (1987) agree that with a common base of mutually acceptable information, stakeholders may change their positions or thinking about the issue.

Having a common basis of data from which to draw inferences for making decisions facilitates stakeholder participation and potentially leads to new options and joint ownership of solutions (Priscoli, 1987, two cases; Burgess and Burgess, 1997, experience; President's Council on Sustainable Development, 1997, review and synthesis of several collaborative processes). In conjunction with increasing communication and understanding, sharing information helps to build trust between stakeholders (President's Council on Sustainable Development, 1997). Carpenter and Kennedy (1988) add that human relations are as important as technical data, but the parties must agree on the basic data.

Setting timelines

Developing a mutually acceptable timeline for a process can be useful, although actually determining the timeline may be challenging. The time period needed for each case will differ, and the length of the process may be difficult to determine at the outset. In their analysis of seven cases, Crowfoot and Wondolleck (1990) state that establishing a timeline provides a structure to help participants prepare and plan tasks for each meeting. Between these seven case studies, the process length from initial meeting to final document ranged from one month to two years. While establishing a timeline can help stakeholders pace their workload, the number of meetings, the length of the process and other factors may be difficult to determine beforehand (Manring et al., 1990). While a timeline may be helpful, the

likelihood of reaching an agreement is not clearly affected by the pressure of a deadline (Priscoli, 1987, two case studies of wetland fill and hydrocarbon exploration; Bingham, 1986, 161 cases).

If a group decides to establish a timeline for the EDR process, the parties should agree on realistic deadlines. Carpenter and Kennedy (1988) report that parties should be sure to allow themselves enough time to complete tasks or relationships or trust between contending groups could degenerate. Based on a decade of experience and research in mediation in the Public Disputes Program at Harvard Law School, Susskind et al. (1987) maintain that without a timeline, problems could arise if actors view time differently. For example, one stakeholder may wish to resolve the issue rapidly, while another party may hope to delay the process indefinitely. The authors assert that a timeline may help circumvent this type of controversy.

Collaborative efforts are time consuming, a factor which can deter parties from participating. The process can require a lot of time and effort on the part of participants, including keeping constituents informed, assimilating relevant information, maintaining group cohesiveness and support from organization members and attending the meetings (Mangerich and Luton, 1995, field burning case). The group should identify external constraints that may influence stakeholder participation or the pace of the proceedings (Carpenter and Kennedy, 1988; decade of experience). For example, a government agency may have a time limit for a decision or a rancher may be busy with calving season and therefore not be able to attend meetings. Citizen participants differ from government and business representatives in that the former frequently are not paid to partake in the process and the citizens do not have access to the staff and other resources that are often available to other representatives. Based on stakeholder responses to seven cases, Crowfoot and Wondolleck, (1990) state that citizen volunteers communicated that participating in the process "drains" a lot of time and other resources from members. In addition, respondents recommended that interest groups utilize organizational staff and volunteers to support the members participating in EDR process. In their involvement in two cases involving wilderness designation in Idaho, Baird et al. (1995) report that negotiations ended because citizen participants felt the process was too time-consuming. Additional factors that hindered

collaboration was that a full-time person could not keep all the constituents informed, and that because of great distances between stakeholder's residences, many conversations were held by telephone, which can hinder communication between the participants.

Besides time, money and other resources are generally needed for the collaborative process to function. At various stages of the process, operating funds may be necessary for items such as gathering and distributing information, arranging meetings and implementing the final agreement. With twelve years of experience and research in collaborative processes, Gray (1989) suggests that groups make efforts to obtain funds to ensure that all actors may participate equally in the process.

Reaching an agreement

Exploring options

Given the complexity and diversity of interests involved in many environmental conflicts, participants should brainstorm to create a number of options for a solution before deciding on one. During the process, actors should be creative and develop a range of solutions that satisfy their own interests as well as those of other parties (Fisher and Ury, 1981, theory and experience). Based on views from a decade of EDR research and experience, Susskind and Cruikshank (1987) maintain that all stakeholders should participate in offering options to resolve the problem. In addition, collaborative brainstorming improves the chance of finding a mutually acceptable proposal. Since some parties may be reluctant to voice ideas out of fear of appearing to be giving too much or being committed to their idea, Fisher and Ury (1981, theory and experience) suggest that groups establish a period of "inventing without committing" in which parties are free to develop ideas, but are assured that what is said does not constitute a commitment. While creating a variety of strategies, Burgess and Burgess (1997, seven years of experience) state that parties should take a long-term view of the conflict and not focus exclusively on the immediate problem, which may help minimize the recurrence of similar instances in the future.

Reaching an agreement generally means gaining commitment from all of the stakeholders to a single option or package of options. When multiple options are involved, Carpenter and Kennedy (1988) support using a method they call the 'building-block approach' in which parties first find agreement on individual options and then combine the

options into a final agreement. This method allows the parties to partition issues into manageable pieces and advance, which can provide parties a sense of accomplishment as each issue is settled. An alternative approach found to be successful is to have parties first create a general framework for an agreeable solution. After considering several options, stakeholders combine options that satisfy all of the interests into one agreement, and then work out the details of the agreement (Gray, 1989, over twelve years of experience and research in collaborative processes). For example, how a piece of property is going to be used could be the basis for an initial agreement, and subsequently the parties decide on the limits and restrictions to place on the property. This method provides a starting point of agreement that encourages further discussion and helps parties feel like they are making progress.

Consensus

Scholars and researchers generally encourage consensual decision-making. The intent of consensus is to increase communication between the parties and to reach better decisions with greater ownership and acceptance by parties (Carpenter and Kennedy, 1988, decade of experience; Gray, 1989; 12 years experience). The process requires discussion and allows participants to present their views while maintaining power to protect their interests (President's Council on Sustainable Development, 1997, review and synthesis of several collaborative processes). The objective of consensual approaches is to provide win-win outcomes that satisfy all stakeholder interests to some degree (Susskind and Cruikshank, 1987, decade of research and experience). Voting can undermine the intent of the collaborative process because voting produces winners and losers, and therefore may leave some parties dissatisfied with the outcome (Manring et al., 1990). In their analysis of seven cases, Crowfoot and Wondolleck (1990) report that parties in six of the case studies used consensus decision-making, while in a ground water case the players reached an agreement by consensus but made a final decision by voting. From analyzing several collaborative processes, Moscovici and Doise (1994) conclude that consensus can lead to more creative solutions because groups tend to take more risk than individuals, and parties who accept an agreement are more inclined to stick with the decision. However, some means of implementing the decision must be available and agreeable to the stakeholders because

parties will be unlikely to participate if the ultimate agreement is not likely to be implemented (Priscoli, 1987, two case studies of wetland fill and hydrocarbon exploration). Basing their views on an analysis of three watershed partnership cases, Toupal and Johnson (1998) concur that consensus decision-making contributes to a successful partnership process. Carpenter and Kennedy (1988) agree and add that in consensual decision-making each person should be asked directly for a yes or no response to whether they accept the proposed agreement, because some people may confuse silence with agreement.

While most authors recommend reaching agreement by consensus, Crowfoot and Wondolleck (1990) provide an example in which a different method was successfully used. In a Wisconsin legislative ground water case, participants created proposed legislation that was to be introduced to the Environmental Resources Committee for alteration and approval before it was introduced to the entire legislature for debate and a final vote. In this instance, the actors in the collaborative process did not reach full agreement on all parts of the proposed legislation. After agreement was reached on the main issues and the proposal was submitted to the Environmental Resources Committee, parties who were not satisfied with certain sections of the proposal lobbied committee and legislative members.

Many EDR processes utilize consensus decision-making. However participants may not think positively of the process. Chamberlin (1998) surveyed participants in three collaborative resource management groups, and found that while respondents thought consensus worked well to address the concerns of all the stakeholders and gave each person an opportunity to voice their thoughts, some participants felt the process was not always fair and that not everyone had equal power. In certain instances, participants felt pressure to go along with the rest of the group or neglected to voice their opinions because of feeling "stupid" around other members with more education and communication skills. One of the participants in a collaborative decision-making process commented:

> One of my other concerns is that it's never a level playing field. That you take people who are professional resource management people who have been through school, who can do pretty good in debate discussion and they are put into a 'stakeholder' situation with ranchers and individuals who are not on that same degree of discussion and then there is said do you agree or don't you agree, we've got the answers...these people are always sort of intimidated to a

> degree by saying 'God, I must be stupid, I don't understand what they are saying,' or 'Jesus, I don't necessarily agree with that, but boy, I don't want to look stupid, nobody else disagrees.'...All the people that are in the minority, they will just continually badger and badger them until they say, okay, go ahead, I don't care. That's not consensus but I believe that is what has developed and I believe it has been developed purposely (Chamberlin, 1998, p. 62).

To prevent this, and improve stakeholder participation, authors suggest parties receive training in EDR and negotiating skills. Actors can have different levels of experience in skills utilized in the EDR process. In their analysis of seven cases, Crowfoot and Wondolleck (1990) recognized that participants who were not experienced in legal bargaining or business negotiating were at a disadvantage, had less confidence and were not as successful compared to business and government officials who often had prior experience in the needed skills. The authors therefore suggest that organizations choose a representative who has good negotiation skills and who will be able to communicate and protect a group's interests. After a decade of experience and research in mediation at the Public Disputes Program at Harvard Law School, Susskind et al. (1987) found that providing actors with pre-EDR training can help discussion remain focused, friendly and productive. Based on years of experience in the EDR field, Capenter and Kennedy (1988) agree that parties who are unfamiliar with the collaborative process or do not fully understand the problem should be educated ahead of time.

Training in the process can enhance participation and help establish a more level playing field between representatives. For their negotiated rule-making program, the U.S. Environmental Protection Agency (EPA) invites all parties to an eight-hour training program before the process commences (Schneider and Tohn, 1985, 73). The objectives of the training program are to:

1. educate participants about the fundamentals of negotiations,
2. improve participant's awareness of the program,
3. develop negotiating skills, bargaining strategies and negotiating style, and
4. demonstrate ways to apply these skills in the upcoming session.

The final agreement

Before an agreement is finalized, all parties should insure support and agreement from the constituents and organizations that they represent. Moreover, stakeholders should have a clear understanding of whether a person's signature commits the individual or an entire organization to the agreement. Basing their views on a decade of experience and research in mediation at the Public Disputes Program at Harvard Law School, Susskind et al. (1987) state that representatives of organizations should keep constituents informed about all aspects of the process and discussion, up to and including the final document. Before signing the written agreement, representatives should ensure that constituents accept the final document, because an agreement can be terminated if constituents do not agree with the final document (Susskind et al., 1987). The agreement may need to be ratified if a representative's constituents disagree with the final agreement or think an issue was left unresolved, which underscores the importance of maintaining good communication between representatives and their respective interest groups (Susskind and Cruikshank, 1987, decade of research and experience).

Statements or provisions as to what will happen if conditions change should be included in the agreement. For example, budget cuts, new regulations or changes in personnel can occur between the time an agreement is reached and when it is implemented. Based on a decade of experience, Susskind and Cruikshank (1987, p. 124) state that parties should include 'contingencies' in an agreement for "renegotiation or remediation" in case circumstances change that affect the implementation of the agreement. Problems can arise if organizations change their personnel or policies (Carpenter and Kennedy, 1988, decade of experience). One party in a settlement may discover that a program it promised to initiate will be more expensive than anticipated and top management does not agree to a larger budget. Or an organization's goals and priorities may change. For example, if the person responsible for carrying out an agreement within an organization leaves, no one will be left to implement the organization's commitment. The group should consider what to do if a person or organization does not follow through on an agreement. Based on twelve years of experience in collaborative initiatives, Gray, (1989) states that actors should approach the "noncompliant party" and take steps to ensure compliance or discuss ways to accommodate

the changed circumstances. After years of experience in EDR, Susskind et al. (1987) state that parties should establish a mechanism to bind actors to the agreement. One method these authors have used was to have each actor post a bond. Any party not fulfilling the agreement forfeits the bond and, conversely, when the agreement is fully implemented, the bond is returned to the individuals. After a group decides how to address changes or other unplanned contingencies, it may be useful to have written statements.

Several authors encourage parties to establish the agreement in written form. In an analysis of seven cases, Crowfoot and Wondolleck (1990) report that the participants involved thought that a written final agreement helped prevent misunderstandings and to ensure accountability and commitment by all stakeholders. Manring et al. (1990, years of experience) concur. A written agreement helps parties reach consensus, ensure parties have a concrete understanding of the agreement, and provides a tangible reference for constituents to review (Schneider and Tohn, 1985, participation in two EPA cases; Susskind and Cruikshank, 1987, decade of research and experience; Susskind et al., 1987, decade of experience and research). Susskind et al. (1987) have had experiences where parties in a collaborative process reached an agreement, but once the parties saw it in writing, the agreement was not what they had imagined. Without a written agreement, parties can have different interpretations, which can lead to problems during implementation (Susskind and Cruikshank, 1987).

A written agreement may take many forms. For example, in the seven cases Crowfoot and Wondolleck (1990) examined, the final written agreements included a proposed legislative bill, recommendations for a management plan, and policy recommendations to government agencies. In one instance citizens disapproved of a Department of Natural Resources (DNR) management plan, and the parties collaborated with the agency and other participants to rewrite the plan, and thereafter submitted the final version to a state commission for approval.

To help ensure implementation success, stakeholders should consider several factors in the written agreement. After years of experience in collaborative conflict resolution, Moore (1996) states that the agreement should include: 1) the steps needed to implement the decision, 2) who will implement and monitor the agreement, 3) procedures to manage

unexpected problems, 4) methods to monitor compliance, and 5) criteria by which success will be measured.

A critical aspect of collaborative processes is participant belief that if an agreement is reached, it will be implemented. Therefore, the group needs to decide on the implementation process. Carpenter and Kennedy (1988) have encountered collaborative processes in which the parties made an agreement and then walked away without deciding who, when and how the agreement would be implemented. Therefore, the authors suggest that this information should be included in the written agreement. Citing evidence from seven cases, Crowfoot and Wondolleck (1990) report that project monitoring is often neglected because of participant rush to finish the process and because participant resources were exhausted. Consequently, the authors suggest that before the process ends, representatives should decide how and when the agreement will be implemented and monitored. Carpenter and Kennedy (1988) state that when an agreement is not implemented, parties resent the wasted time and effort and consequently become angrier with each other than before the settlement process. From years of experience in collaborative conflict resolution, Moore (1996) states that insufficient consideration of implementation may result in outcomes that could engender reluctance to participate in the future, damage relationships, and waste time, money and resources.

Implementing and monitoring the agreement

The people who are going to implement or be bound by the final agreement should participate in designing the solution and reaching the agreement. Based on 12 years of experience in collaboration, Gray (1989) states that problems can occur when the persons charged with implementing an agreement differ from those who participated in the process that created the agreement because those responsible for implementing the project do not share a common ownership or history in the agreement. Gray suggests that participants plan for this problem and involve the implementers early in the collaborative process. In a study of 116 site-specific cases in which agreement was reached, Bingham (1986) found that implementation rose from 67 percent to 85 percent when someone with authority to implement the decision was involved in the process from the beginning.

All parties should maintain communication during the implementation of an agreement. Gray (1989) emphasizes that if an organization or agency is responsible for

implementation, the original participants should stay informed of project advancement in case problems arise that need to be discussed. After examining case studies in national forest planning, Wondolleck (1985, p. 354) stresses that parties should maintain "ongoing communication and dialogue" during the implementation of the agreement to ensure stakeholder interests are satisfied and to address issues if problems arise. In some instances, a stakeholder may serve as a liaison to inform fellow participants of the implementation progress. After examining seven EDR cases, Crowfoot and Wondolleck (1990) state that depending on the situation, citizens, organizations or agencies, or combinations thereof, can act as overseers to monitor project implementation. In one case, the DNR oversaw the implementation of a water system and mailed monthly reports to those who had participated in the agreement process.

Stakeholders should decide how an agreement would be monitored. Carpenter and Kennedy (1988, experience) and Susskind et al. (1987, decade of experience) agree that a monitoring system should be part of a written agreement, and regardless of who does the monitoring, parties should be kept informed of progress. In addition, the responsibilities of those charged with monitoring the implementation should be defined in the agreement (Moore, 1996; Gray, 1989, decade of experience). Actors may want to specify performance measures to measure the progress of implementation (Susskind and Cruikshank, 1987, decade of research and experience). Under certain circumstances, measuring the success of an agreement on the environment can be challenging. For example, in a case regarding the field burning of grass in the northwest U.S., monitoring the improvements in air quality was challenging (Mangerich and Luton, 1995).

Measuring success

Measuring the success of EDR approaches is a challenging endeavor that generally involves both objective and subjective standards. Propst (1997, p. 35) states that one of the most challenging aspects of collaborative processes is the lack of "explicit, tangible criteria for evaluating success." He identifies two ways to gauge success. There are intangible criteria, such as improved communication and civility. Over time, the intangible factors can act as building blocks for more tangible success, such as whether land goes into conservation

easements or resources are protected, or a measure of community diversification and widespread participation.

More specifically, the objective criteria generally include whether a mutual agreement was reached, and secondly, whether the agreement or project was implemented (Gray, 1989). Each agreement contributes to the ability of the parties to work together to manage future problems (Laue, 1987; Bingham, 1986). Subjective criteria recognize that each party involved in a conflict is a good judge of the outcome. Successful resolution implies that an agreement is mutually determined and the outcome provides some degree of satisfaction for the parties concerned (Laue, 1987). If the participants believe the process was fair, the issues were addressed and their interests were satisfied in the outcome, the agreement will be more likely to be considered a success (Bingham, 1986). While parties may not achieve the desired outcome, the project or process may render other benefits such as increased communication, fewer conflicts or learned information that may be applicable in the future.

Potential beneficial outcomes

Communities are evolving systems, composed of people who interact and live in a particular area. All communities are confronted with conflicts, and the capacity of members to address problems in a positive fashion may reflect the level of trust and interaction within a community.

Communication and trust between inhabitants of a community can serve as a form of capital. Capital is any resource that can be used to produce goods. Among people in a community, there are various levels of inter-personal trust, reciprocity and civil engagement, which can be defined as social capital. Putnam defines social capital as "features of social organization, such as networks, norms and trust, that facilitate coordination and cooperation for mutual benefit. Social capital enhances the benefits of investment in physical and human capital" (1993, pp. 35-36). In summary, social capital is the capacity of individuals to work together to address problems, satisfy mutual needs and pursue common interests.

Social capital can be horizontal, hierarchical or non-existent (Flora, in press). Horizontal models assume egalitarian forms of reciprocity, where individuals are expected to give as well as receive and each person is perceived as being able to contribute something of

value to a community. Examples are donating to or volunteering for community projects. Under hierarchical systems, reciprocity is vertical rather than horizontal; individuals at the bottom are beholden to those in power centered at the top (e.g. gangs or the mafia). In communities where social capital does not exist, there is little trust or interaction. The majority of interaction consists of "market relations, characterized by contracts and law suits" (Flora, in press).

There is evidence that horizontal social capital has been declining in the U.S. (Bellah et al., 1985). In the U.S., the traditional social structure emphasizes individualism and utilitarianism, with dominance, competition and appeasement emerging as skills necessary for survival; each factor contributing to the decline of social capital (Flora, 1997; Coleman, 1988; Fukuyama, 1995; Clark, 1990). The loss of connection and trust between people can result in societal disorder and conflict. Wilson goes so far as to claim that this decline is what lies behind the "psychological, spiritual and economic malaise in communities" (1997, p. 745).

It is only recently that people are studying the benefits of trust, collaboration and reciprocity within communities, their social capital. Individuals possess characteristics, such as knowledge, skills and leadership, which are referred to as human capital. Human capital can be used to enhance social capital, which in turn can contribute to the productivity of a community (Flora and Padgitt, 1995). Putnam (1993) reports that trust and reciprocity among community members promotes business networking, joint ventures, and shared equipment, services and information. In addition to economic activity, diverse social networks can evolve, creating connections between communities that involve sharing information and collaborating on projects, what Flora and Flora (1992) define as "lateral learning." Communities with a high degree of horizontal social capital produce an atmosphere that is conducive to collaborative activity, where citizens have a sense of responsibility, where people listen to one another and are able to work together to resolve conflicts and satisfy mutual needs while pursuing common interests (Lean, 1995). Hence, in theory, the trust and communication that parties establish by participating in an EDR process can enhance social capital within a community, which in turn can produce social and economic benefits for a community. Likewise, with social capital, communities with common goals can

collaboratively make decisions and take actions that enhance environment health, called natural capital, such as improved quality of air, soil and water, and biodiversity. It is also true that social capital can detract from ecosystem health. However, the sociologists referenced here maintain that cooperation, responsibility and trust between citizens are necessary to maintain a healthy ecosystem for future generations.

Summary

The key factors emerging from the literature that affect the success of EDR are:

1. Inclusivity of the primary stakeholders
   a. Stakeholders have support from organization or interest group
   b. Equality among stakeholders
2. In a collaborative manner, participants:
   a. Design the process and procedures by which to operate
   b. Establish common goals and objectives
   c. Jointly define problems
   d. Gather technical and local data to establish a common base of mutually acceptable information
   e. Explore options
   f. Reach an agreement by consensus
   g. Insure the agreement is implemented and monitored

These factors will be used as a basis to evaluate the collaborative program that is the focus of this study. Figure 2.1 provides a graphical depiction of the EDR process.

Environmental Conflict in the Western States

Values, interests and public resources

A feature of contemporary industrial society is that as technical knowledge increases, people attempt to manage more aspects of the environment and its resources for their needs. In democratic societies, citizens, government, organizations and industries participate in using, preserving and managing the natural environment, and depending on their role, individuals, or the organizations they represent, have values, beliefs and interests relating to how the environment should be utilized. Conflicts between people over the use of the environment and natural resources have been common human experiences but are growing in number and importance as the human population grows, technology empowers it, and the consumptive use of energy, space and material increases (Crowfoot and Wondolleck, 1990; Glasbergen, 1995; Kellert, 1996).

General Structure of Environmental Dispute Resolution Process

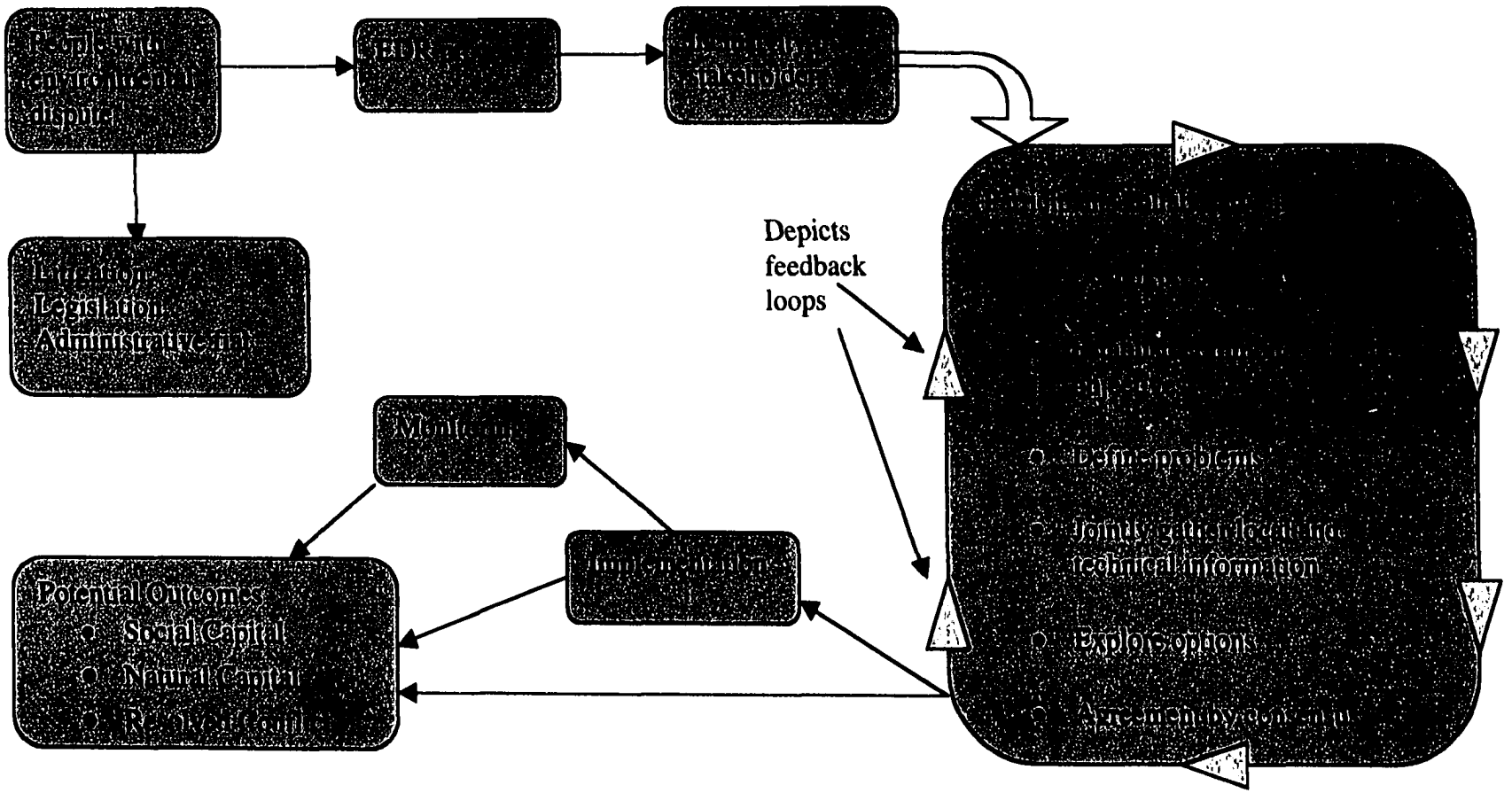

Figure 2.1. Graphical model of environmental dispute resolution process. Shaded arrows depict feedback loops.

Competition over resources has increased in many of the western U.S. states which are experiencing high rates of human population growth and expansion. These states, west of the 100th meridian, contain a majority of the nation's 662 million acres of public land. The government agencies managing these lands, such as the Bureau of Land Management (BLM) and the United States Forest Service (USFS), are frequently drawn into environmental conflicts. Since the enactment of the Multiple-Use Sustained Yield Act in 1960, federal public agencies are charged with applying "multiple use" management philosophies requiring administration of public lands for outdoor recreation, range, timber, wildlife and fish harvest, and the enhancement of natural scenic, scientific and historical value (Rowley, 1985; Floyd, 1993). Under the multiple use model, government sets broad policy, interest groups compete to influence policy formulation and local agency representatives shoulder the responsibility of interpreting and implementing the policies (Floyd, 1993). Groups, organizations or companies with interest in altering or harvesting resources on public ground, such as the mining or timber industry, may submit project proposals to the government agencies that oversee the land or resources of interest. Citizens or environmental organizations may disapprove of the proposed resource extraction and lobby against it. After reviewing proposals, assessing environmental impacts, evaluating alternatives and public opinion, an agency renders a decision. Making the "right" decision, the decision that would please all parties, however, is difficult and unclear because numerous and varying opinions and interests are often involved. Wondolleck observed, "In practice, the (decision-making) process is not sufficiently informative or convincing; it is divisive; and moreover, it is not decisive" (1988, p. 70-71). As a result, the public resource agencies are involved in several environmental conflicts. In the early 1980s, the administrator of the U.S. Environmental Protection Agency (EPA), William Ruckelshaus, acknowledged that EPA's present rulemaking process is not efficient, and that "about 80 percent of all of the rules that EPA issues are challenged in court" (cited in Schneider and Tohn, 1985, p. 68). "Every effort by public agencies to shift priorities in response to new problems is met by fierce resistance from organizations that are content with the status quo. Media campaigns, intensive lobbying, referendums and similar strategies give these groups substantial leverage" (Susskind and Cruikshank, 1987, p. 38).

During the last few decades, the U.S. government has taken action to involve the public in decision-making processes. However, some of these actions have undermined agency effectiveness. Government agencies often solicit public input on decisions through public hearings and notices, and then evaluate and incorporate the input with other data to render a decision. Basing her views on work with public agencies, Wondolleck (1985, p. 342) found that individuals are often not satisfied with the process because of their inability 1) to directly participate, 2) to clarify or expand their concerns, 3) to correct inappropriate response to the issues, and 4) to see how their comments affected final decision-making, how and where their concerns were accommodated and why some issues could not be incorporated as desired. Often interests such as wilderness and mining, forestry and preserving habitat are not compatible. Agencies face disparate interest groups with different stakes in the outcome and divergent views of an appropriate outcome. Wondolleck (1985) provides an example of the Wilderness Act of 1964. Congress passed a broad national policy mandating the USFS and National Park Service to recommend to Congress the lands that should be designated as 'Wilderness.' Recognizing that they were trying to appease very different and competing constituencies, the USFS undertook a massive campaign to involve the public.

> The agency held 227 workshops nationwide, involving 17,000 people, to help develop selection criteria for their inventory of potential wilderness lands and for the alternatives to be evaluated in the Environmental Impact statement. Agency planners then developed proposed inventory criteria from the workshops and released them for public review and comment. Fifty thousand comments were received on the proposed inventory and evolution criteria and the USFS planners considered these comments in developing their final criteria. (Wondelleck, 1985, p. 345)

In the end, several parties were "outraged." Citizens and organizations who supported wilderness preservation thought the final decision did not include enough acreage, while the mining and timber industries claimed that the wilderness allocation proposal was too excessive and would lock up critical resources needed to meet the needs of U. S. citizens.

Wildlife, also considered a public resource, is managed by the U.S. Fish and Wildlife Service (FWS) and state wildlife agencies. Traditional wildlife management and policy has "mirrored" the utilitarian philosophy prevalent in the United States; agencies have managed

wildlife "to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of people" (Mangun, 1992, p. 4). This means mainly sport hunting and fishing. Changing demographic patterns and public opinion, however, are placing new and different demands on wildlife managers (Mangun, 1992). As more land is appropriated to meet the needs of expanding populations, and as human traffic on public lands increases, wildlife are impacted by destruction and confinement to smaller and more fragmented areas. With the recent expansion of non-consumptive wildlife-associated recreation, increased anti-hunting sentiments, shifting values towards wildlife protection, and legislation such as the Endangered Species Act of 1973, wildlife agencies are confronting greater public controversy (Kellert, 1996; Mangun, 1992; Mangun at al, 1992).

In addition to public controversy, conflict also arises between and within government agencies. Problems can occur between government agencies due to differences in agency values and cultures, organizational structure and sensitivity to external influences and pressures (Harvey, 1992). Diverging values and attitudes of employees within the USFS can cause controversy within the agency. Comparing their survey of USFS employees with a similar study 10 years earlier, Brown and Harris (1992) note that in the 1990s, USFS officers expressed greater concern for environmental protection and land stewardship than a decade earlier. In addition, contemporary officers placed greater value on non-commodity uses of national forest resources such as recreation and water quality, and were less inclined than they were in the 1980s to favor commodity resource outputs from national forests, such as timber harvesting, livestock foraging and mineral extraction.

As the human population in western states multiplies, rural natives and urbanites are becoming neighbors. Olinger (1999) analyzed Internal Revenue Service migration data from 1990 to 1997, and discovered that the majority of people moving to Colorado suburbs and rural areas are from urban areas. Many of the urbanites that settle in rural areas or small towns bring different values and interests regarding nature and wildlife than those of native rural inhabitants. Kellert (1996) investigated the attitudes and behavior of people towards animals and nature and found differences between urban and rural perceptions of nature and wildlife. He states that rural and resource dependent populations "tend to favor the utilization, subordination and control of nature, while urban and suburban groups "express

greater concern for the protection of wildlife and natural habitats" (1996, p. 57). Kellert continues, "many rural people have a deep affinity for the land and its creatures, but they tend to view these resources from the perspective of their utility and a familiarity that often takes their long-term welfare for granted." In contrast, a

> ...highly romantic appreciation of the natural world frequently prevails among urban people, leading them to view as irrelevant and sometimes contemptible the practical dependencies of mastering wild living resources. Many city residents barely recognize nature as an integral part of their urban lives...from the perspective of benefits derived from environmental exploitation... ...and practical considerations of animal harvest, control, and utilization are often viewed as unappealing and even repugnant (1996, p. 57-59).

Environmental conflict stems from the interaction of people and their differing values and interests regarding nature and wildlife. Traditionally, in the United States, decisions and actions involving natural resources often hinged on utilitarian and capitalist principles such as belief in abundance and progress, faith in science and technology and commitment to a laissez-faire economy and private property rights. A growing human populace places greater demands on remaining resources and some citizens are concerned with, and are challenging, the historical approach of managing natural resources. The government has been responding to this concern by creating additional legislation and changing the way government agencies manage resources and make decisions. Many agencies are creating an infrastructure to increase public involvement in resource management decisions. Moreover, educational institutions are being encouraged to emphasize more training in social sciences and communication in natural resource management programs, and to involve students in real management scenarios (Nielsen, 1987; Knuth, 1987). As human populations grow, and demographics, technology, and values change, there is great potential for increasing conflict between individuals and groups over the utilization and management of the environment. Do collaborative approaches to mediating environmentally related conflicts yield better outcomes than traditional methods?

CHAPTER III
HISTORICAL PERSPECTIVE

Problem Statement

This research examines the process and outcomes of a collaborative program called the Habitat Partnership Program (HPP). The program is an ongoing collaborative effort to resolve conflicts between big game and livestock interests on private and public land in Colorado. Conflicts involve forage loss and fence damage borne by ranchers as a result of big game activity. For this study, big game species include American elk (*Cervus elaphus*), pronghorn antelope (*Antilocapra americana*) and Rocky Mountain mule deer (*Odocoileus hemionus hemionus*). Contenders involve public resource management agencies, landowners and sportspersons, and at stake are policies and practices such as big game and habitat management, hunting and livestock grazing. Several western states have similar conflicts between big game and livestock interests, and wildlife agencies continually receive complaints from landowners. The present project analyzes a new and unique effort to address these problems in a collaborative fashion.

Overview

Contemporary environmental issues and problems in Colorado are not new. The history of the United States contains many similar instances of competition and conflict over resources, especially in the western United States. European immigrants arrived with domesticated livestock, and a series of characteristic values and interests, and the actions of the newcomers altered landscapes and impacted native flora and fauna.

Colorado's rugged terrain supports a diversity of vegetation and animal life. By the turn of the 20th century, however, new settlers had killed or displaced native human and big game populations, and livestock had denuded the landscape of vegetation. As open space continued to be settled and grazed, the government initiated programs and regulations to curb public resource loss and revive big game populations. The number of big game multiplied, however a large portion of the animals' traditional habitat and migration routes were now human-dominated landscapes and fenced agricultural enterprises. Competing with livestock for food on overgrazed rangeland, big game herds often sought forage on private property, especially during the winter months when the herds descend the mountains to forage in the

valleys, where coincidentally, most of the ranches are located. While many ranchers tolerated big game on their land, the migrating species habitually consumed forage and damaged fences on which the landowners depended. Consequently, these issues became a source of contention between public resource managers, ranchers and hunters in the 1930s and persist to this day.

The root of many contemporary natural resource conflicts stems from the interests and actions of earlier generations. To better grasp the factors that molded the present scenario in Colorado, a brief description of the ecological features and a historical perspective on the evolving interrelationships between people, livestock and the native fauna and natural habitat of Colorado follows.

Ecological Features of the Project Area

The Colorado terrain

Colorado is a diverse semiarid region of mountains, plateaus, canyons and plains. The state spans an area of 272,000 sq. km, or 27,022,309 ha, and ranges from 1,021 m to 4,390 m in elevation, with 54 mountain peaks over 4,267 m. Colorado lies between approximately 102 and 109 west longitude and 37 and 41 north latitude and is subdivided into 63 counties. The eastern third of the state consists of flat plains and rolling prairies that gradually rise westward to front-range foothills and the higher ranges of the Rocky Mountains. The Continental Divide runs from north to south through west central Colorado and bisects the state into the eastern and western slopes. The western slope consists of alpine terrain interspersed with wide valleys, rugged canyons, mesas and high plateaus.

The study area encompasses the east slope foothills, the Rocky Mountains and the western slope, approximately the western two-thirds of the state. Precipitation is greater on the western slope, ranging from an average annual precipitation of 203 mm at the lower elevations to 1,016 mm near the mountain summits, while averaging 330 mm on the front range foothills (Griffiths and Rubright, 1983).

Colorado contains a variety of plant communities and habitat, from the eastern plain prairies to the Rocky Mountain tundra (Figure 3.1). Shrub and woodland species inhabit the transition zones from the eastern grassland plains to montane conifer forests, as well as the

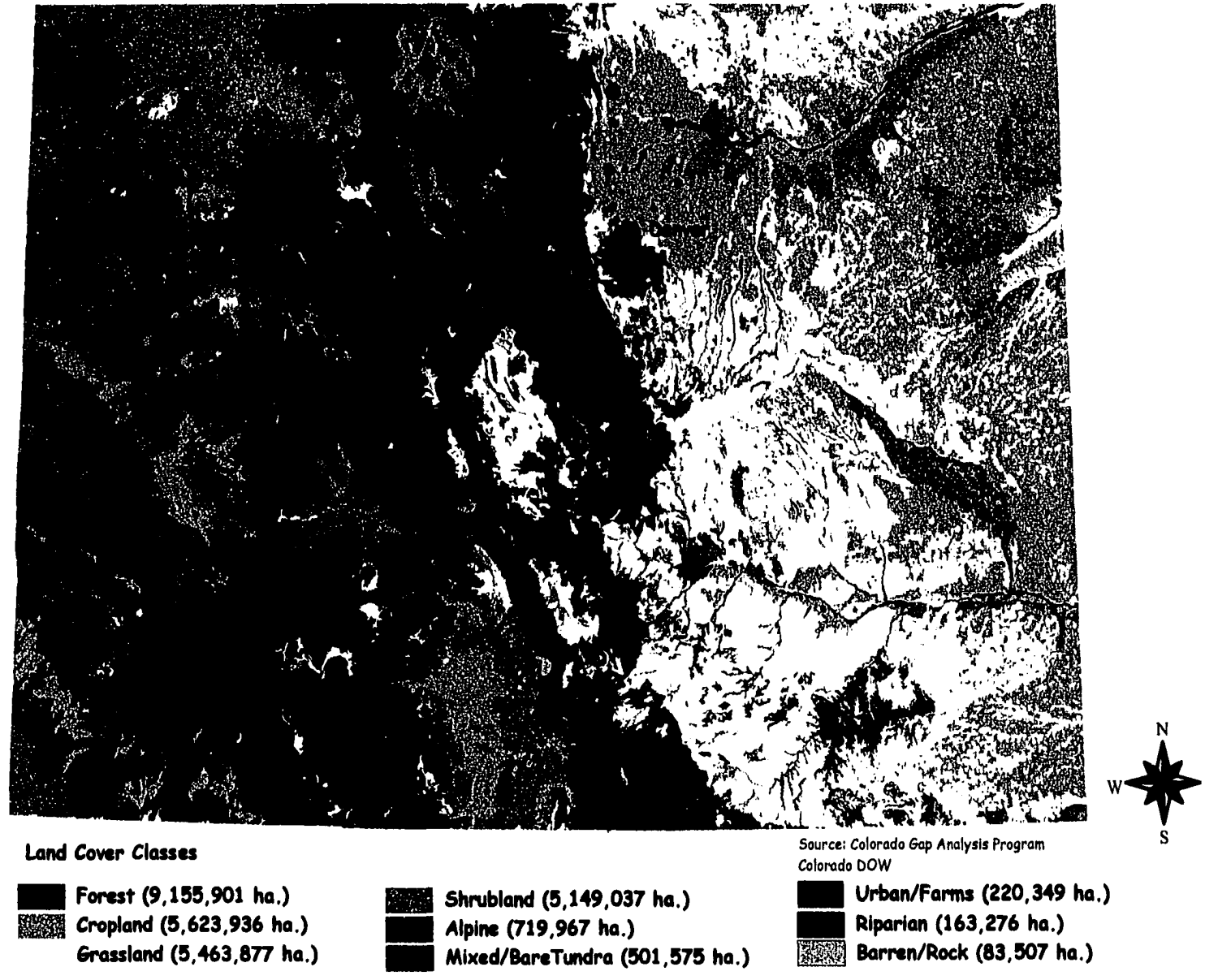

Figure 3.1. Vegetative land cover of Colorado.

mesas and lower elevations on the western slope. These areas include combinations of piñon pine (*Pinus edulis*), junipers (*Juniperus* spp.), gambel oak (*Quercus gambelii*), four-wing saltbush (*Atriplex canescens*), sagebrush (*Artemisia* spp.) and fescues (*Festuca* spp.). This habitat ranges from approximately 1,220 to 2,440 m and covers roughly 35 to 40 percent of the state (Fitzgerald et al., 1994).

Trees dominate the montane zone, from about 1,700 m. to 2,740 m. The region covers about ten percent of the state and the dominant species are: ponderosa pine (*Pinus ponderosa*), douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), Colorado blue spruce (*Picea pungens*) and quaking aspen (*Populus tremuloides*). Narrow-leaf cottonwood (*Populus angustifolia*), alder (*Alnus tenuifolia*), and willows (*Salix* spp.) are along streams. The aspen stands typically have a well-developed understory of 'mesophytic' forbs and grasses, in contrast to most conifer stands with sparse understories (Peet, 1988). Treeless patches of parks and meadows, containing grasses, sedges and forbs, are scattered throughout the forested areas.

The subalpine zone, from 2,740 to 3,450 m, is a relatively dense forest on steep slopes. The most abundant species in this zone consists of Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and bristlecone pine (*Pinus aristata*). This zone contains the highest elevation forested ecosystem and occupies about 15 percent of the state.

The alpine tundra, above 3,350 m, consists of a mat of low growing grasses, sedges and herbaceous plants such as: kobresia (*Kobresia myosuroides*), alpine avens (*Acomastylis rossii*), tufted hairgrass (*Deschampsia caespitosa*) and sedges (*Carex* spp.). Alpine tundra occurs above the subalpine zone and occupies less than five percent of the land area (Fitzgerald et al., 1994).

Colorado's diverse habitat contains over 960 wildlife species. Of the eight species of artiodactyls inhabiting the state, American elk, pronghorn antelope and Rocky Mountain mule deer are considered big game and are the three most intensively managed species (Barrows and Holmes, 1990; Armstrong, 1972). These three species are ruminants, and are categorized in the same suborder as domesticated cattle (*Bos* spp.) and sheep (*Ovis aries*).

Domesticated livestock consume similar foodstuffs as wild ungulates, and therefore compete with the native ruminants for forage and habitat. Following is a brief description of native big game species and their habitat and forage regimes.

American Elk

Prior to European settlement, elk ranged over most of North America. In Colorado elk roamed the entire state, but currently the animals are associated with semi-open or forest edges adjacent to parks, meadows and alpine tundra in western Colorado (Fitzgerald et al., 1994; Armstrong, 1972). The majority of elk are found in the western two-thirds of the state, and at elevations above 1,800 meters. Elk are known to occupy higher elevations in the spring and summer and migrate downslope to forage on winter range. Elk may not migrate, however, depending on the weather and availability of adequate forage (Fitzgerald et al., 1994; Peek, 1982).

These cervids are generalist feeders with a highly variable diet that overlaps those of other ungulates. Peek (1982) states that 159 forbs, 59 grasses and 95 shrubs have been reported as elk forage in the Rocky Mountain region. Grasses and shrubs constitute the majority of the winter diet. During the winter months browse species, such as aspen, serviceberry, sagebrush and gamble oak, make up approximately 56 percent of an elk's winter foodstuffs (Peek, 1982). Elk favor grasses during spring and fall, but consume mostly forbs and browse species during the summer. Grasses and browse species are the plant groups used most frequently by elk (Peek, 1982). Cattle consume primarily grasses and are potential food competitors with elk. Skovlin, et al., (1968) report that elk and cattle consume many similar plant species and consequently competition for forage is greater when rangeland conditions are poor or cattle stocking rates are high.

Pronghorn Antelope

Pronghorn antelope are most abundant in shortgrass or midgrass prairies in the foothills and mountain grasslands of eastern and northern Colorado, generally between 914 and 2,134 m. Whether antelope make seasonal migrations between winter and summer ranges depends on the availability of suitable forage (Kitchen et al., 1982). The average annual diet of antelope is approximately 43 percent forbs, 43 percent browse, 11 percent cactus and three percent grass (Armstrong, 1972). Shrubs compose from 70-90 percent of the

diet during the fall and winter months, and forbs account for 64-80 percent of the spring and summer diet. Domestic sheep may compete with antelope for forbs and shrubs, but horses (*Equis asinus*) and cattle prefer grasses and are not considered to be competitors with antelope for foodstuffs (Kitchen et al., 1982). After analyzing 20 studies of antelope and livestock dietary overlap, Yoakum and O'Gara (1990) reported low levels of forage overlap between antelope and domestic horses and cattle, but medium to high levels (33 to 60 percent ratio) between antelope and domestic sheep. The ratio indicates the percent of plant species in an area that were consumed by both antelope and domesticated sheep.

Rocky Mountain Mule Deer

Mule deer occupy all habitats in Colorado, from grasslands to alpine tundra, but the majority are found in mountain foothill habitats and shrublands that provide both browse and cover (Armstrong, 1972). This species is known to take seasonal migrations, spending summer at higher elevations and moving downslope for winter range. Migration appears to be triggered by greater snow depth and unavailability of sufficient forage. Mule deer have a broad diet but the majority of their annual forage consists of browse and forbs. Mackie et al. (1982) report that 788 species of plants, including 202 shrubs and trees, 484 forbs and 84 grasses, sedges and rushes, are eaten by Rocky Mountain mule deer. During the winter, a deer consumes roughly 74 percent browse species and 15 percent forbs. Spring and summer diets are roughly 50 percent browse and 46 percent forbs. However, browse use increases to 60 percent in the fall and consumption of forbs decreases to 30 percent (Fitzgerald, 1994). Cattle prefer grasses and have little diet overlap with deer. Domesticated sheep, however, browse on similar shrub species as deer, and are potential competitors with deer for foodstuffs (Skovlin, et al., 1968; Ngugi et al., 1992).

Colorado in Historical Perspective

People, ungulates and the struggle for habitat

Ungulates and humans have traversed Colorado for millennia, searching and competing for resources. Many ungulate species coexisted with the Ute, Navajo and Apache tribes until 1540 when the Spaniards arrived in Colorado with new technologies, ideologies and species (Abbott et al., 1994; Fritz, 1941). Between 1600 and 1800, Colorado was an area

of contact among dissimilar peoples – Utes, Spaniards, and Frenchmen — all competing for control of territory (Marsh, 1982). Likewise, comparable ungulate species – elk, mule deer, buffalo, cattle, horses and sheep - competed for similar habitat.

For years, space and wild game were relatively abundant and the Native Americans and immigrants were able to maintain an uneasy equilibrium while pursuing individual lifestyles, needs and interests. The indigenous and European populace frequently exchanged knowledge and goods, but the two groups tended to have different views of local resources. For the indigenous populace, the territory's native flora and fauna provided a natural store of food from which to draw. In contrast, the immigrants thought that land should be owned and used for economic gain, and that wild game was expendable in favor of livestock as a source of food. The number of European settlers continued to rise, and the newcomers were able to shift the balance in their favor.

The newcomers multiplied and spread through the new territory. During the 1800s, thousands of European trappers, miners, ranchers, settlers and business people arrived in Colorado "with dreams of making a buck" (Abbott et al., 1994, p. 51). In 1859 alone, over 100,000 prospectors arrived in Colorado to join in the Pikes Peak Gold rush. This, in conjunction with a diverse set of interests and needs on the part of the various groups of immigrants, initiated a period of fundamental change and conflict in Colorado.

The indigenous settlers

The growing immigrant population continuously demanded more Native American land. Aided by their numerical advantage, persuasion and ammunition, they got it. The Native Americans reacted to the danger the continuing encroachment posed to their lands and way of life with raids and battles, and many lives were lost on both sides. The Europeans attempted to appease the natives with temporary treaties and agreements. At the same time, many Colorado immigrants thought "these savage tribes... must finally become extinct, leaving their rich possessions to be occupied and developed by a more appreciative race" (Abbott et al., 1994, p. 123).

The Ute Nation, estimated to include 10,000 people in the eighteenth century, slowly dwindled, and by 1873, the Ute population consisted of 3,500 to 4,000 people, still divided into their native seven bands (Marsh, 1982; Steward, 1974). A treaty in 1868 created a single

reservation, roughly encompassing the western third of Colorado, for the seven Ute bands. The immigrants, through treaties and by force, gradually decreased the size of the Ute reservation. In 1880, a new treaty required the 800 remaining Weeminuche, Mouache and Capote Utes to move to a reservation 24 km. wide and 185 km. long in the southwest corner of Colorado, and forced the remaining four northern Ute bands to a reservation in Utah (Marsh, 1982; Fritz, 1941). Before the last northern Utes left Colorado in September of 1881, the new settlers "were laying out new towns" on old Ute lands (Abbott et al., 1994, p. 124).

Native ungulates

Some newcomers viewed the abundance of wildlife as an opportunity to profiteer: shallow headwaters were dynamited for fish; hundreds of beaver were trapped for pelts; and market hunters killed tons of big game to supply meat for miners, and residents of towns and eastern cosmopolitan cities (Barrows and Holmes, 1990). In the 1860s it was considered "sport" to shoot wildlife and "waste was not a consideration," many hunters killed big game for the horns and other trophies and left the meat to rot (Barrows and Holmes, 1990, p. 13).

Bison were one of the most affected species. During the 1800s, bison roamed the plains by the millions, but the species was nearly extinct by the end of the same century. Fritz (1941) notes that hunters killed millions of buffalo for the hides alone. Moreover, within a period of twenty years, bison "became a rare circus and zoological specimen" (Fritz, 1941, p. 268). A trophy hunter killed the last Colorado bison in 1897, and by 1899, only 39 of the original millions remained protected in Yellowstone National Park (Barrows and Holmes, 1990).

Antelope numbered in the millions in the early 19th century, but between 1850 and 1900, commercial and sport hunters and pioneers killed an estimated 99 percent of the antelope (Yoakum and O'Gara, 1990). By 1910, fewer than a thousand antelope or elk were reported to remain in Colorado (Armstrong, 1972; Fitzgerald et al., 1994)

During the 1800s, and until there were sufficient domestic livestock, many settlers depended on game for their sustenance and local citizens became concerned about the diminishing wildlife population. Realizing the wildlife could not long withstand the unlimited killing, Colorado passed the Preserve Game Act in 1867, which made it unlawful to kill any elk, deer, antelope or mountain sheep between January 15 and August 15. No

provision was made for law enforcement until 1897, when the Colorado Division of Wildlife (DOW) was created (Barrows and Holmes, 1990). Enforcement was challenging during the early years due to limited staff and funding, and as a result ungulate populations continued to decline. Elk populations were so low at the turn of the century that Colorado imported elk to re-establish herds. As an additional effort, the 1913 Legislature mandated that male mountain sheep, antelope, deer and elk could not be hunted from 1913 until 1924 so that they would not "meet the fate of the buffalo and become entirely extinct" (Barrows and Holmes, 1990, p. 39).

Native habitat and introduced ungulates

Prior to 1860, the majority of population growth and habitat impact came from human influx, but thereafter cattle and sheep were introduced to Colorado by the thousands, replacing the buffalo and other dwindling game species on the range. In 1862, the United States Congress passed the Homestead Act to transfer federal land to private ownership and encourage settlers to establish crop and livestock agriculture in the new territories. The Act allowed for 65 hectares (160 acres) of unoccupied public land to be settled – a sufficient amount to sustain an agricultural family in the East but one that proved inadequate in the arid western habitat (U.S. Department of the Interior, BLM, 1984). The Act discouraged large acquisitions of public land and left unsettled lands to be used freely. Since 65 hectares were not enough to support a family, many ranchers depended on the use of public lands to graze their stock. By the 1880s and 1890s, this caused chaotic conditions in many western range areas (U.S. Department of the Interior, BLM, 1984).

The growing numbers of people and livestock increased competition for land, food and water. In Colorado, the human population grew approximately 1000% in the 20 years starting in 1870 (Table 3.1). Over 2.5 million cattle, sheep and horses inhabited Colorado by 1890. Pioneer ranchers, interested in making a profit and establishing rights to land, overstocked the ranges with sheep and cattle to prevent the encroachment of newcomers (Rowley, 1985; Barnes, 1926). Over time, intensifying competition between stockmen resulted in bloodshed and range destruction as "each man looked upon the range forage as something he must grab before anyone else could reach it... the grasses were given no chance to grow...might was the law" (Barnes, 1926, p. 14).

Table 3.1. Human and livestock population in Colorado. Source: Colorado Agricultural Statistics Service, 1937-2000.

Colorado Demography				
Year	**Human**	**Cattle**	**Sheep**	**Horse**
1860	34,277	Not recorded	Not recorded	Not recorded
1870	39,864	Not recorded	Not recorded	Not recorded
1880	194,327	809,000	1,256,000	44,000
1890	413,249	1,176,000	974,000	195,000
1900	539,700	1,223,000	1,430,000	227,000
1910	799,024	1,102,000	1,435,000	300,000
1920	939,629	1,757,000	989,000	421,000
1930	1,035,791	1,454,000	1,715,000	338,000
1940	1,123,296	1,400,000	2,677,000	222,000
1950	1,325,089	1,800,000	1,782,000	121,000
1960	1,753,947	2,267,000	1,989,000	Not recorded
1970	2,209,596	3,212,000	1,303,000	Not recorded
1980	2,889,735	2,975,000	870,000	Not recorded
1990	3,294,394	2,900,000	840,000	Not recorded
2000	4,301,261	3,150,000	440,000	Not recorded

Albert F. Potter (as quoted by Rowley, 1985) provides a generalized picture of the rangeland scenario in the 1890s. Potter, who ranged cattle and later directed the Grazing Section of the Forest Service, stated:

> ...by 1895, no open range remained unstocked...the grazing lands were stocked far beyond their capacity; vegetation was cropped by hungry animals before it had opportunity to reproduce; valuable forage plants gave way to worthless weeds and the productive capacity of the lands rapidly diminished... The mountains were denuded of their vegetative cover, forest reproduction was damaged or destroyed, the slopes were seamed with deep erosion gullies, and the water-conserving power of the drainage basins became seriously impaired...Class was arrayed against class – the cowman against sheepman, the big owner against the little one – and might ruled more often than right. Deadlines (if an animal crossed over a border they were killed) stretched their threatening lengths across the country, jealously guarded by armed men; battles were fought and lives sacrificed; untold thousands of animals were slaughtered in the fight for the range. Probably no class of men deplored this state of affairs more deeply than did the stockmen themselves, but they were victims of circumstance and governmental inaction with no course open to them other than the one they followed (Rowley, 1985, p. 20)

By 1900, Colorado was home to half a million people and nearly three million cattle, sheep and horses, which placed greater strain on the remaining resources. Concern over the exhaustion of resources inspired the Federal Government to take action to protect some of the nation's resources. In 1891, Congress passed the General Land Law Revision Act, sometimes called the Forest Reserves Act, that authorized the president to set aside forest reserves from the unoccupied public domain to protect forest resources from extensive timber cutting, mining and grazing (Rowley, 1985). In 1901 President Benjamin Harrison set aside four forest reserves totaling 1.3 million hectares in Colorado (Abbott et al., 1994; Barrows and Holmes, 1990). The Department of the Interior's General Land Office administered the reserves until 1905 when the administration was transferred to the Bureau of Forestry (today's Forest Service) within the Department of Agriculture.

Grazing had become one of the primary uses of the forests and the government's proposal to limit the free use of public lands for grazing by requiring permits and fees in the reserves generated much controversy between groups of people, even between the ranchers themselves (Abbot et al., 1994). In 1899, the General Land Office instituted a stock permit grazing program for the 1905 season in hopes of attaining a "peaceful allotment of range forage" and establishing goals for "range renewal and conservation" (Rowley, 1985, p. 34). The grazing program made initial steps towards range preservation and management. The forest reserves, however, encompassed only a small portion of the public domain, and left the remaining public grazing areas under intensive utilization. To remedy this, members of Congress introduced legislation to regulate livestock use on the remaining public land every year between 1899 and 1933. The livestock growers, however, opposed the legislation and prevented its passage.

The 1930's – compensation and regulation

In the early 1930s, Colorado was home to over 3.5 million cattle, sheep and horses. In addition, the public land and the livestock industry continued to suffer from overstocking, drought and shifting market prices. As a result of the difficult times, ranchers appealed to their congressional representatives for "some form of relief" (U.S. Department of the Interior, BLM, 1984, p. 3). Combining previously introduced bills with the desires of the

livestock industry and public land administrators, Colorado Congressman Ed Taylor introduced the Taylor Grazing Act (TGA) to bring the remaining public lands under government supervision (Rowley, 1985).

In 1934, President Franklin D. Roosevelt signed the Act "to stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; to stabilize the livestock industry dependent upon the public range..." (U.S. Department of the Interior, BLM, 1984, p. 3). Grazing districts and fees were developed on the millions of hectares of unclaimed public lands and were managed by the Division of Grazing in the Department of the Interior (USDI) until the BLM was established in 1946 (USDI, BLM, 1984). Meanwhile, big game were making a comeback in numbers.

In conjunction with the drought, depression and range issues, ranchers experienced greater pressures from the growing wildlife populations, which consumed their forage and damaged their fences. Most of the ranges were overgrazed and the big game herds often sought relief on private lands, especially during the winter months. Many ranchers tolerated game on their lands, but the damages were increasing, and landowners often feared a shortage of hay for their livestock.

In 1931, in an effort to compensate landowners for losses and increase their tolerance of wintering animals, the first game damage legislation was passed. The Colorado General Assembly made the Colorado DOW liable for damage done to private property by "protected wild animals" (Barrows and Holmes, 1990, p. 55). The legislation included all wildlife, until 1972, when the legal definition of "protected wild animals" for game damage purposes was changed to include only big game species (Barrows and Holmes, 1990, p. 55). The species considered big game in Colorado includes, elk, antelope, black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), mule deer, mountain lion (*Felis concolor*), bighorn sheep (*Ovis canadensis*), and mountain goats (*Oreamnos americanus*). Claims for compensation had to be reported within 10 days of the incident and a DOW officer had 20 days to investigate the claim. If an agreement was not reached, arbitrators were selected and claims were paid within 60 days from the arbitrator's appointment. The claims were paid from the DOW game cash fund, which is money received

from the sale of hunting license permits. Many hunters disapproved of their funds being used to pay ranchers for damage caused by big game (Barrows and Holmes, 1990).

The challenges of game damage and management grew as the elk and deer multiplied and surpassed their area's carrying capacity and the number of damage claims increased. From 1920 to 1940, the elk population grew by 12.5 percent and the mule deer population by 27 percent; hunters killed only 5 percent and thousands of elk died from starvation (Barrows and Holmes, 1990). Game damage claims were draining DOW funds and fence and forage damage was consuming ranchers profits, so the Division implemented other methods to reduce losses. The DOW paid for fencing haystacks, opened new hunting seasons, developed winter feeding programs, and killed problem animals and gave the meat to charity. The first two initiatives helped alleviate some of the pressures. However, the latter two proved too expensive and too controversial to continue (Barrows and Holmes, 1990).

The growing game herds had fewer wide-open spaces to roam, and areas that were available were mostly overgrazed. In 1940, Colorado's 27 million hectares supported 1,123,296 people and 4.4 million cattle, sheep and horses. In 1936, two years after passage of the Taylor Grazing Act, the USFS and the Department of Agriculture issued a report on the rangeland conditions of the western states, called *The Western Range.* The report stated that the public domain lands, then under the Department of the Interior's management, were the worst of any lands under Federal administration, "with 1.5 percent moderately depleted, 14.3 percent materially depleted, 47.9 percent severely depleted, and 36.3 percent extremely depleted" (USDI, BLM, 1984, p. 17). In response to the report, a USFS range specialist commented that the "...national forest ranges were certainly no shining example of successful protective administration either" Rowley (1985, p. 157).

By 1940, many of the conflicts involving big game and livestock interests present in Colorado today were already in place (Figure 3.2). The BLM and USFS, partially funded by grazing fees, were directed by the government to improve range conditions on public ground where large numbers of big game and livestock grazed. Concurrently, the two agencies were frequently confronted with the controversial issues of grazing fees, permits, and livestock reduction involving the livestock industry and sportsmen, who often had opposing views. Ranching operations evolved, and often hinged upon, the ability to graze livestock on public

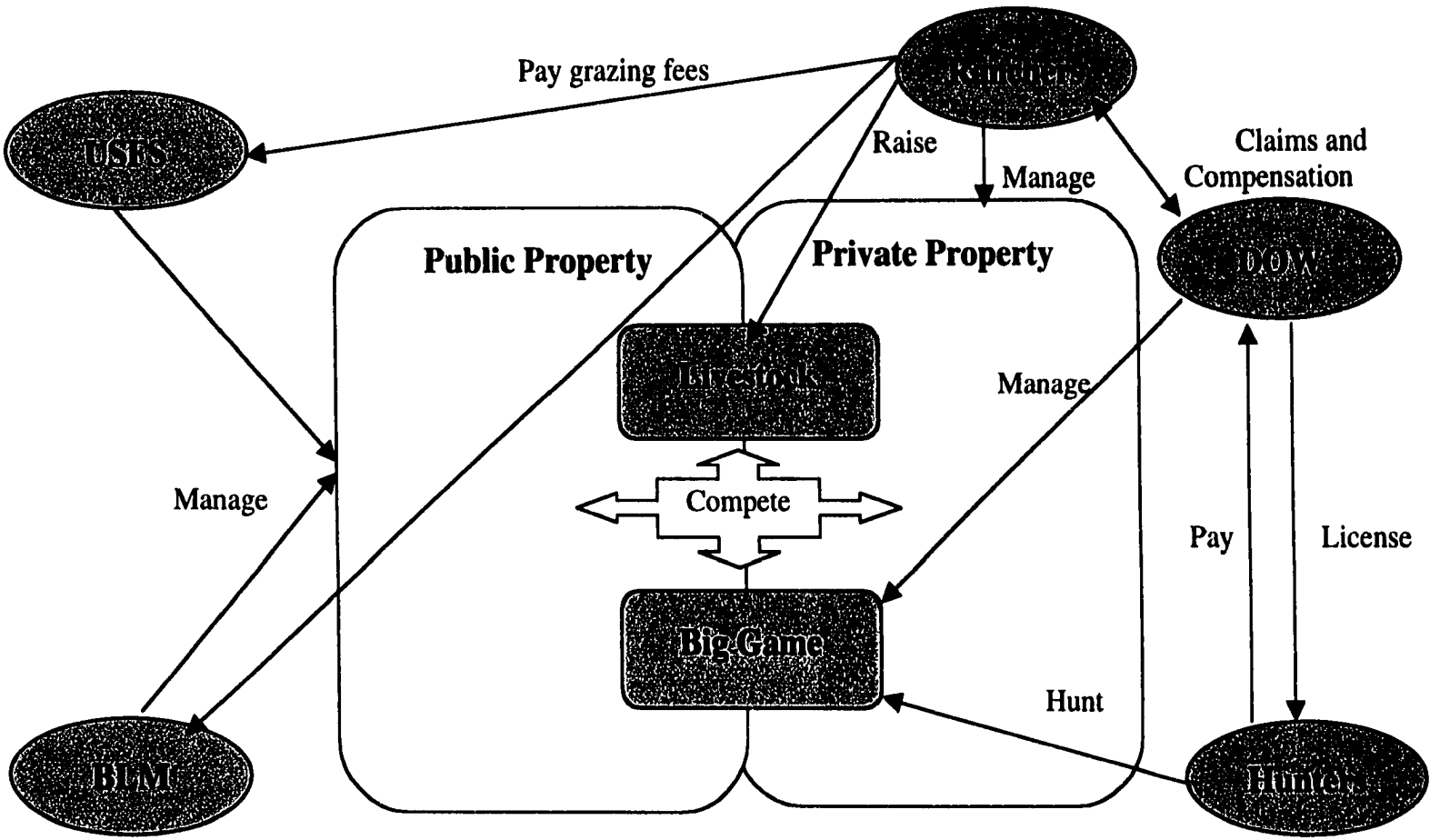

Figure 3.2. Graphical depiction of the relationship between the main parties involved in conflicts involving wildlife and livestock.

land. Moreover, many ranchers, already burdened with fluctuating markets and weather conditions, could ill afford fence damage and forage loss due to big game species, and therefore frequently supported reduction of big game populations. In addition, several ranchers did not allow hunters on their property for fear of, or prior experience with, hunters shooting livestock, damaging property or leaving gates open. Many sportsmen, who hunt for sport, meat and/or profit, supported large populations of game and often objected to their hunting fees being used to pay game damage compensation to ranchers, especially to ranchers who did not allow hunting on their land. The DOW, partially funded by hunting license sales, was challenged to manage migrating big game herds on lands over which they had little or no control – on private lands and on public lands with unfavorable range conditions and competing livestock – and given a populace with disparate opinions. In addition, the DOW "contended that wildlife was here first, and that the state should not be charged with paying damages that animals might cause to private property" (Barrows and Holmes, 1990, p. 152). Meanwhile, the big game and livestock competed for forage.

Conflict continues in Colorado, 1940-1990

The controversy between big game and livestock interests continued for 50 years. While the issues remained much the same, the problems magnified. Between 1940 and 2000, Colorado's human populace grew by 3.2 million (Table 3.1). The influx of people created new challenges for Colorado regarding wildlife, land use and other environmental issues, and placed additional pressure on state resources. New people need homes and supplementary services, and as a result, agricultural land and open space are consumed with housing developments and strip malls. In Colorado, the amount of agricultural land declined by over a million hectares between 1980 and 1990 – an average loss of 121,407 hectares per year – and the number of farms declined by 50 percent since 1940 (Table 3.2). The progressive loss of agricultural land and wildlife habitat to development concentrated wildlife onto smaller and more fragmented areas, which were often agricultural land. Many ranchers had tolerated wildlife on their land, however, since the 1940s, property damage from big game has risen, as have the costs borne by ranchers.

Population growth and development also impacted Colorado's public land, and created additional challenges for public resource agencies. During this time period, interest and concern regarding the environment broadened, and participation in various wildlife and

outdoor recreation increased. New residents added to the multiplicity of views and understanding of wildlife and resource management. Moreover, with more people in the state, Colorado's 11 million hectares of public land was more frequently the site of year round human activity. While government agencies attempted to manage public land for wildlife, resources and other "multiple use" interests, the increased human traffic on public land and diversity of public opinion added to the complexity. The changing populace and landscape made the Division of Wildlife's task of managing wildlife species more difficult. The big game species had fewer places to retreat as human activity displaced them from public land and agricultural habitat dwindled. Consequently, the DOW received more claims for fence and forage compensation.

Table 3.2. Colorado farms and land in agriculture. Source: Colorado Agricultural Statistics Service, 1937-2000.

Year	Number of Farms	Land in Agriculture (ha)
1940	52,000	13,354,770
1950	47,000	15,782,910
1960	37,000	16,592,290
1970	30,500	16,066,193
1980	26,500	14,568,840
1990	26,500	13,354,770
2000	29,000	12,788,204

Frustration and concerns over wildlife management and property damage escalated among the DOW, agriculture producers and sportspersons during the 1980s. One of the main points of discontent between the DOW and ranchers was the Division's traditional method of compensating landowners for fence and forage damage from wildlife. To initiate a claim, the 'burden of proof' was placed on the landowner (Gerrans, 1992). The 1979 legislation required landowners to complete several forms to document the amount of damage caused by wildlife and to prove that the loss was a result of big game activity. Moreover, landowners were required to document the species and the number of animals that damaged their property. Accurately measuring forage loss and the number of big game responsible for the losses proved difficult (Gerrans, 1992), especially when the damage occurred at night or if opinions differed on the number of big game in the specified area. After a claim was submitted, a

Division officer was required to investigate, document and verify the accuracy of the claim, a process that frequently cost more than the amount of the claim (Gerrans, 1992).

The process was not the only point of discontent. Gerrans (1992, p. 1) reported that the most frequently expressed frustration from landowners was that they thought it was "unfair for landowners to support increasing numbers of big game animals, particularly elk." One issue in which many landowners agreed with the Division of Wildlife was that there were too many elk for the available habitat. Big game hunters, however, disagreed. Hunting is one of the main methods used to manage big game populations. However, during hunting season game frequently take refuge on private land. Big game hunters were upset that ranchers collected game damage compensation and claimed there were too many elk, but would not allow hunting on their land. Many landowners would not allow hunting on their land because of prior experience or problems with hunters. Meanwhile, the elk population grew and habitat was lost.

An Alternative Approach

Habitat Partnership Program

Heightened frustration and dissatisfaction with traditional game compensation procedures brought leaders of the DOW and the Colorado Cattleman's Association together in 1989 to find an alternative means to alleviate the concerns. Members of these two groups assembled a team of government resource management personnel, agricultural and environmental organization representatives, sportspersons, and other stakeholders with interest in agriculture and resource management. The team generated guidelines to establish a collaborative method for addressing conflicts involving big game and livestock interests. This program, called the Habitat Partnership Program (HPP), provided an alternative method of handling fence and forage claims and allowed stakeholders to develop creative approaches to reduce wildlife-related conflicts on private and public lands.

The Colorado Wildlife Commission authorized HPP and attendant guidelines in January 1990, and transferred the program to local DOW officers to initiate that same year. The HPP guidelines contain information on forming local committees, locating information on perennial problem areas, initiating projects, and developing a five-year plan. The

guidelines are flexible and can be deviated from "should conditions warrant" (Gerrans, 1992, p. 1). The general objectives, quoted from the program guidelines, are:

1. To encourage an atmosphere of partnership between wildlife managers, habitat managers (including private landowners), and users of the wildlife resources.
2. To establish local committees to ensure appropriate public involvement, on a local basis, in identifying range management problems and recommending solutions to these problems.
3. To allocate and commit funds to carry out solutions to conflicts.
4. To ensure that private land habitat issues are considered in the big game herd management plans.
5. To shift the emphasis for antlerless harvest to remove more of the animals that are causing problems and fewer of the animals that are not (Gerrans, 1992, p. 1).

The Division of Wildlife (DOW) established two prototype HPP committees in February 1990. Since then, one to three additional committees have been initiated annually. As of July 1997, 15 local HPP committees existed throughout Colorado. The areas covered by each committee correspond to pre-existing Game Management Units defined by DOW (Figure 3.3). Each committee area consists of thousands of hectares, including a combination of federal, state and private land (Table 3.3), and a combination of vegetation (Figure 3.4).

Division employees are charged with organizing local committees in areas of conflict. Each committee consists of seven members: three people to represent livestock interests, a sportsperson to represent the big game license-buying public, and one person from each of the following government agencies: Colorado DOW, the United States Department of the Interior Bureau of Land Management (BLM) and USDA Forest Service (USFS). Government agencies appoint someone to the committee with the authority to make decisions. The public and local livestock grower groups, such as the Cattleman's Association and the Woolgrowers Association, nominate three people to represent livestock interests. Likewise, local hunting groups, such as the Colorado Bowhunters Association and the Outfitters Association, nominate an individual to represent their interests.

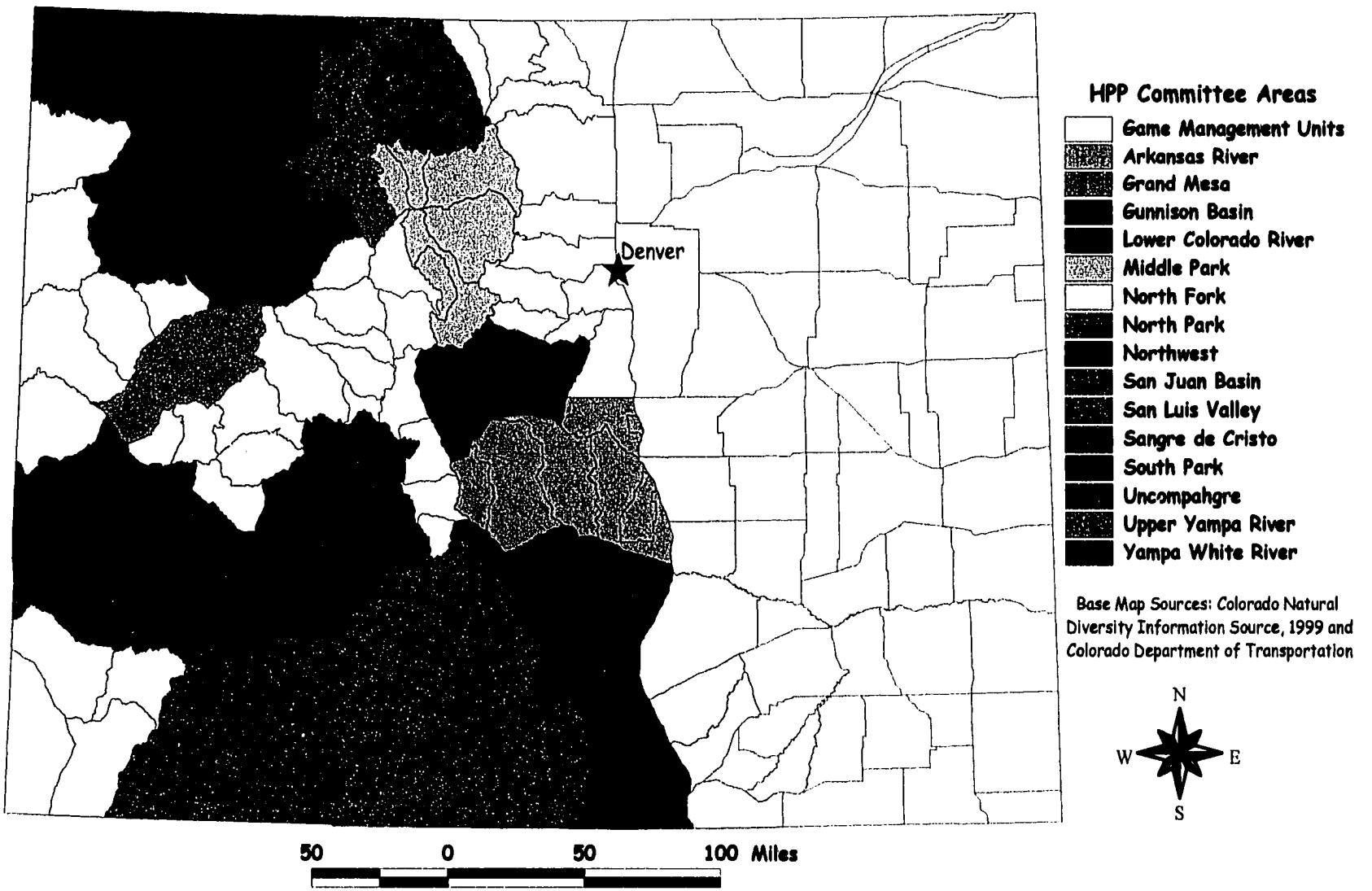

Figure 3.3. Map of State of Colorado with fifteen HPP committees defined by Division of Wildlife Game Management Units.

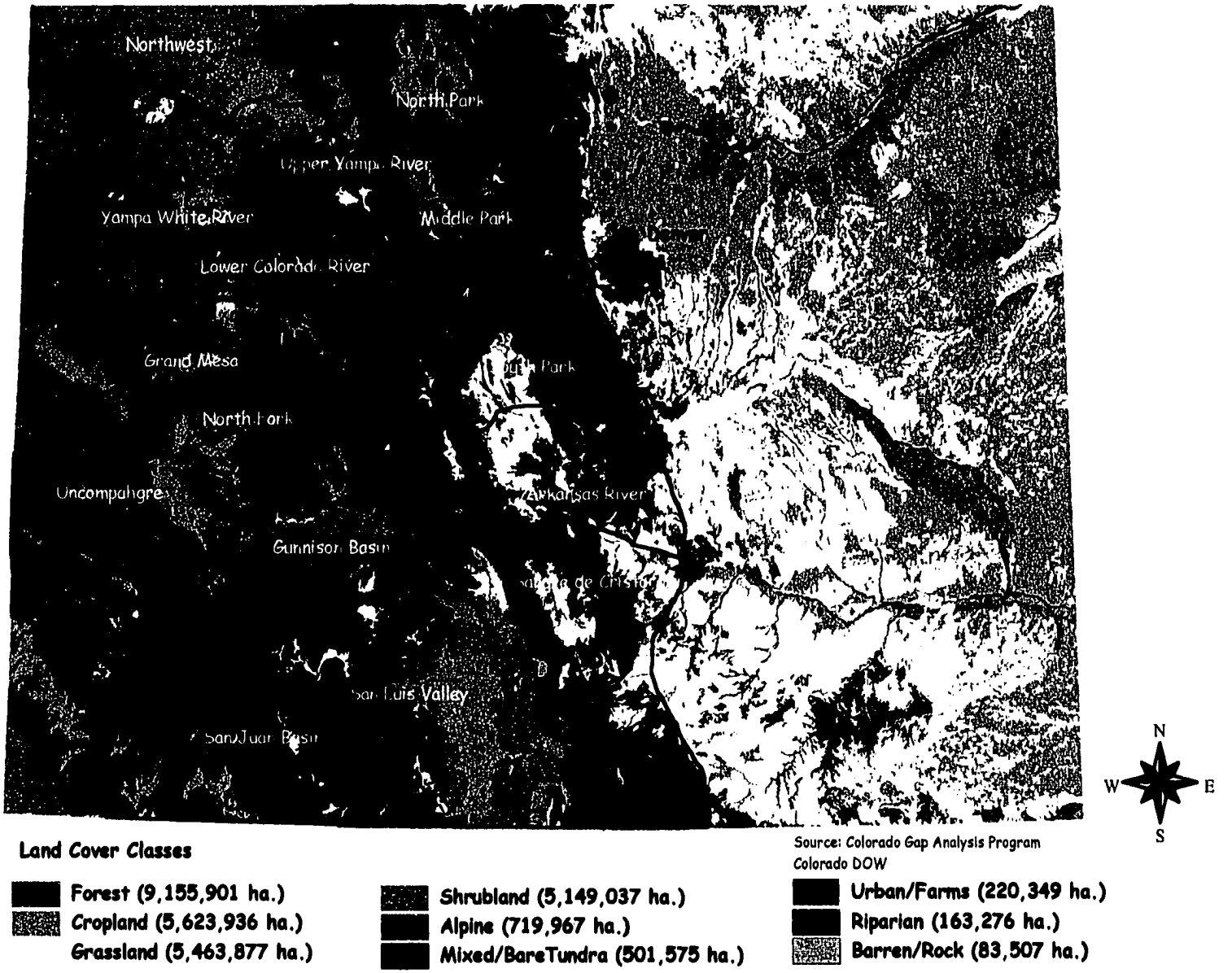

Figure 3.4. Vegetative land cover of Colorado. Management areas of fifteen HPP committees are outlined in black.

The Division of Wildlife supports the program through big game license revenues (Figure 3.5). After receiving their annual funding, committees appropriate their budget to fund projects aimed at resolving or minimizing fence and forage damage caused by big game. The projects generally involve natural resource education, habitat improvement and big game population management.

Table 3.3. HPP committee areas as of July 1997. Source: Colorado BLM Geospatial Data and Colorado Natural Diversity Information System (NDIS), 2000.

HPP Committee	Area in hectares					
	Total area	BLM	USFS	State land	Private	Other*
Arkansas River	800,048	129,873	148,325	63,289	370,290	65,702
Grand Mesa	382,430	78,524	145,304	6,664	99,089	-
Gunnison Basin	928,966	240,195	518,084	10,476	160,211	-
Lower Colorado River	281,902	65,164	141,410	2,276	72,986	65
Middle Park	616,283	55,084	340,032	20,898	161,257	39,010
North Fork	458,350	74,575	220,764	299	157,723	4,989
North Park	419,977	76,863	135,080	50,590	149,983	7,346
Northwest	969,153	442,793	81,151	62,259	344,892	33,023
San Juan Basin	1,003,460	28,140	518,072	15,086	310,827	130,656
San Luis Valley	1,952,380	208,125	748,112	86,093	885,314	24,493
Sangre de Cristo	1,071,913	80,268	179,268	42,707	769,634	-
South Park	440,455	25,372	255,562	23,757	135,763	-
Uncompahgre	1,293,954	467,572	361,523	21,746	409,761	2,722
Upper Yampa River	388,826	21,082	195,184	13,098	159,462	-
Yampa White River	980,066	358,933	191,152	44,090	385,609	282

*Other includes Bureau of Indian Affairs, Department of Defense, National Park Service and the United States Fish and Wildlife Service.

The State Habitat Partnership Council

The DOW Director and Wildlife Commission appoint a nine-person committee of Colorado residents to act as the Habitat Partnership Council. The committee consists of: two sportspersons, two livestock grower representatives, a crop producer representative, a person from the Colorado State University Range Extension Program, and one person from each of the following government agencies, the BLM, the USFS, the DOW. The Council has statewide responsibility and authority, and fulfills duties such as:

1. providing information and advice to local committees,

2. reviewing committee plans and offering revisions,

3. monitoring program effectiveness and proposing to the Commission changes in guidelines, game damage regulations, and land acquisition planning, and

4. certifying to the State Treasurer that payment vouchers submitted by the local Committees are consistent with DMP's approved by the Wildlife Commission. This certification is the only requirement necessary to authorize the State Treasurer to disburse funds from the Habitat Partnership Cash Fund (Gerrans, 1992, p. 2).

The HPP coordinator

The Division of Wildlife designates a DOW employee as the statewide HPP coordinator. The duties of the coordinator encompass a variety of tasks including:

1. presenting DMP plans to the Habitat Partnership Council and Wildlife Commission for consideration, recommendations and approval,

2. assisting the Council in monitoring program effectiveness,

3. certifying to the state treasurer that payment vouchers submitted by Committees are consistent with DMP's approved by the Wildlife Commission, and

4. authoring a report to the Council, the Director of the Division of Wildlife, the Wildlife Commission, Senate and House Agriculture Committees, the Executive Director of the Department of Natural Resources, and the General Assembly specifically stating the committee expenditures (Gerrans, 1992, p. 2).

In addition, the coordinator works extensively with local HPP committees throughout the state. The coordinator plays a key role in learning and sharing relevant information with committees through newsletters, telephone calls and meeting attendance. In addition, this person periodically attends each committee's meetings to learn what is occurring in the area and what problems may exist. Moreover, the coordinator organizes a two-day annual meeting for all committee members and interested parties to interact and share activities, successes and problems, and listen to educational speakers.

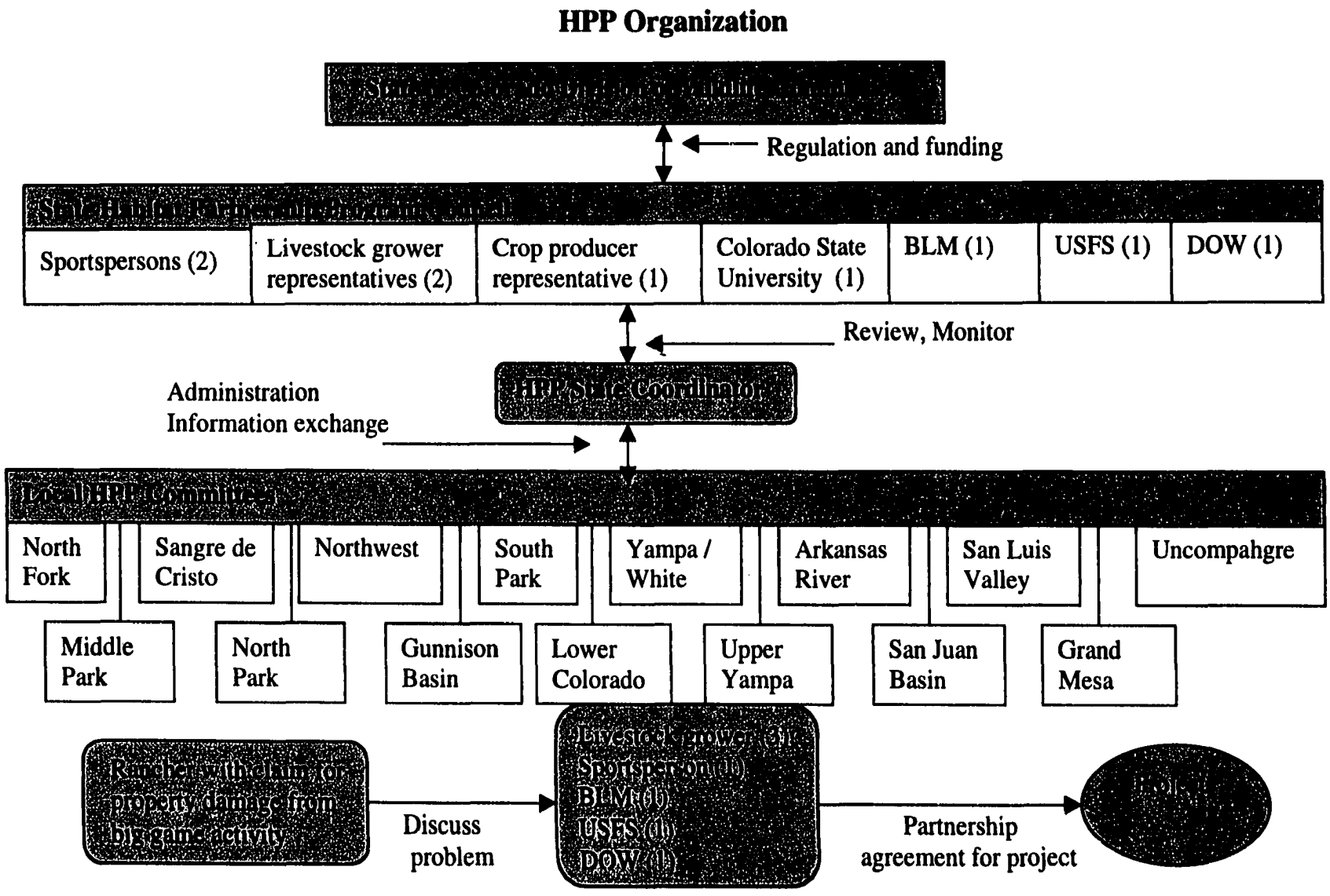

Figure 3.5. Graphical depiction of the organization of the Colorado Habitat Partnership Program.

CHAPTER IV
RESEARCH APPROACH

The objective of this research was to evaluate the effectiveness of a collaborative program aimed at mediating conflicts between people with interests in livestock and wildlife in Colorado. To pursue this issue the following specific questions will be addressed:

1. How does HPP operate in relation to the EDR model?
2. How do the outcomes reached affect the underlying ecology?
3. By using collaborative methods, do the participants address the fundamental causes of conflict?
4. Does the collaborative approach provide more social benefits than the traditional method?
5. Does the cooperative approach build capacity within the community to address similar conflicts in the future?

To answer the aforementioned questions, this research relies upon data collected from interviews, personal observation, documents, and data gathered unobtrusively from separate sources.

In February 1997, at the Habitat Partnership Program's annual conference in Colorado Springs, Colorado, HPP members contracted me to conduct an evaluation of their program. During this meeting, I conversed with several committee members and received my first introduction to the program.

Research began the following summer. Over a twelve-week period I became acquainted with HPP procedures, committee members and projects. I attended at least two meetings of each HPP committee. At these meetings, I observed and took notes on the procedures and interactions of members. Specific notes taken included information on: persons attending, meeting protocols, including leadership dynamics, identity and constituency of individuals who spoke, how conflicts and proposals were introduced and by whom, and how decisions were made and projects funded. I accompanied committees on tours of proposed and completed project sites and recorded information on the projects, the outcomes and members' comments about each. I attended four HPP habitat improvement workshops. At each function, I spoke with individuals about HPP, livestock issues, their jobs, families, their reactions to demographic trends and related topics that served to inform my

understanding of their views and to build rapport with committee members. Starting in August 1997 I began to receive committee mailings, including newsletters, meeting minutes, and annual reports.

On 18-19 February 1998, I attended HPP's annual two-day conference in Grand Junction, Colorado. While at the meeting, I questioned committee members about the activities, challenges and successes of the preceding months. The summer of 1998 was spent attending committee meetings, HPP project tours, workshops and seminars. Notes were taken regarding interaction, communication and processes. I interviewed each committee, as a whole, on their internal operations, specifically about processes, procedures, projects and problems (Appendix A). Responses were recorded by hand, and later the same day entered into a laptop computer.

In November and December 1998, I contacted each committee member by telephone for an individual interview. I asked five questions consistently, and these focused on uncovering whether individuals believed that HPP improved communication and understanding between members and interest groups. I also sought to determine how much interaction existed between committee members beyond regular HPP activity (Appendix A). At the outset, each interviewee was informed about the purpose of the interview and was assured that individual responses would be kept confidential. Comments were recorded by hand, and, when conversation had ended, the information was entered into a computer. Responses to each question were coded on a 0-2 scale, with 0=no, 1=some or little, and 2=yes, and then the results were averaged by committee (e.g. North Park) and by interest group (e.g. sportspersons). Several committee members provided more than simple binary yes/no answers. All lengthy comments were analyzed for trends and commonalities.

During the summer and fall of 1997 and 1998, I collected documents dating back to the 1990 establishment of HPP. Documents acquired from the 15 committees and the HPP coordinator included: each committee's Distribution Management Plan (DMP), annual reports, newsletters, and meeting minutes. In addition, I collected photos, habitat monitoring reports, educational and informative brochures and newspaper articles from each committee. Committees did not record the number of proposals or claims filed nor the number of

agreements reached and implemented. This fact limited my ability to perform quantitative analysis on crucial aspects of the program.

Data gathered from independent sources

To determine the type and degree of environmentally related activity in Colorado between 1990 and 1997, a range of information was gathered from separate sources. This time period reflects the span of time over which HPP had been active when I initiated my study. I gathered information from groups and organizations active in Colorado with goals and objectives similar to those of HPP regarding the environment and natural resource management. I contacted regional directors of the Rocky Mountain Elk Foundation, Ducks Unlimited, The Nature Conservancy, Pheasants Forever and the Western Slope Environmental Resource Council. The director of each organization provided statistics on the number of members, events, and attendees at meetings and events between 1990 and 1997. The same information was obtained from the Colorado Cattleman's Association and the Colorado Woolgrowers Association. The Division of Wildlife provided data on the number of Colorado guides and outfitters during the same time period. Information on the number of people volunteering for environmentally related projects in Colorado was retrieved from the Continental Divide Trail Alliance and Volunteers for Outdoor Colorado.

Statistics on wildlife-associated activity in Colorado were collected from the 1991 and 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation, of the U.S. Department of the Interior Fish and Wildlife Service and the U.S. Department of Commerce Bureau of the Census. Statewide hunting and fishing participation and expenditures were gathered from the Colorado Division of Wildlife Hunting and Fishing Industries Economic Impact Model Summary Reports for 1990, 1992, 1995 and 1997. The DOW provided information on the location, land area and number of ranches in their Ranching for Wildlife Program. Data on the amount of land in conservation easements and other conservation programs was gathered from the Rocky Mountain Elk Foundation, The Nature Conservancy, Colorado Cattleman's Association's Agricultural Land Trust, American Farmland Trust, Colorado Open Lands Trust and the Colorado Coalition of Land Trusts. The number of projects and amount of funding sponsored by the Great Outdoors Colorado Trust

Fund, Noxious Weed Management Fund, Bill 319 Water Quality Improvement Fund was also obtained.

I assembled information about factors and programs that might affect HPP activity. In each of the 30 counties in which HPP is active, county planners were contacted by telephone and asked whether their county's master plan and land use code contains wildlife or habitat protection elements or provisions. In addition, county planners faxed or mailed me copies any existing plans or land use codes. Twenty-five BLM and FS range managers who work in each of the HPP areas, but do not sit on HPP committees, were interviewed regarding the change in range conditions since 1990. From the DOW's traditional game damage compensation program, the Division of Wildlife provided statewide and regional statistics on the number of fence and forage compensation claims and the attendant expenditures between 1970-1998. For each year, statewide statistics on the number of claims, the species connected to the claims, and the amounts paid for claims were available. Generally, the aforementioned information is recorded for regions within Colorado, however, these data were missing for various years. For the DOW's traditional game damage compensation program, the number of regions increased three times between 1985 and 1995, from four regions to eighteen. In addition, no regions correspond directly to HPP areas. For the northwest and southwest Colorado regions identified in the traditional program, the amount paid for game damage compensation for the fiscal years 1992-1996 was available. During these years, eleven HPP committees were active in the northwest and southwest region. However, seven HPP committees started after 1992. For each fiscal year 1992-1996, I combined the compensation expenditures of the traditional program in the two regions, and summed the fencing and habitat improvement expenses of the eleven HPP committees. The data provide information on the difference in expenditures between HPP and the traditional program. HPP committees did not record the number of claims filed or the number of projects implemented. Therefore, I was unable to compare the number of compensation claims submitted or paid between HPP and the traditional program.

Some information that I attempted to gather was unavailable or was found not to be a good indicator of change of range conditions over time. For example, the number of livestock AUM's (animal units per month) on public land. BLM and USFS officers stated that the

number of AUMs rarely changes annually and the number does not always reflect available habitat and forage conditions. In addition, in certain instances AUMs are available but are not used by the rancher.

Demographic data

The areas covered by each HPP committee correspond to pre-existing Game Management Units defined by DOW, and in general do not correspond to county boundaries. For example, one committee area may cover partial sections of four or five counties. This factor limited my ability to make data comparisons between HPP areas, as most relevant data are collected, aggregated and reported by governance units, such as counties. However, HPP areas encompass the major portion of thirty counties, and therefore in certain cases, the summed data from the 30 counties was equated to that of HPP areas.

From the Colorado Agricultural Statistics Service (CASS), I collected information on the population of people, cattle, horses and sheep in the state of Colorado between 1860 and 1990, plus the number of farms and the amount of land in agriculture in Colorado each decade starting in 1940 and ending in 1990. The human population in each county in which HPP is active was gathered from the U.S. Census Bureau for the years 1980, 1984, 1986, 1990-1997. For the years 1982, 1987, 1992, and 1997, the USDA Census of Agriculture database provided Colorado county statistics, including, 1) populations of cattle and sheep, 2) number of farms, 3) average farm size, 4) area of land in agriculture, 5) cost per acre of land, 6) and income from agriculture. From the U.S. Census Bureau, I retrieved data on the number of house building permits in each county before 1940, and the number authorized each consecutive decade until 1989. These data were utilized to find the change in housing density over time.

GIS methods

All geographical information system (GIS) data collection, analysis and map generation was performed by Kathy Andersen, Research Associate with the Iowa Geographical Analysis Program, Animal Ecology Department, Iowa State University. GIS data layers were acquired on-line from the Colorado Natural Diversity Information Source (NDIS). The data layers were imported into the Geographical Information Systems (GIS) software ARC/Info and ArcView 3.2 (ESRI, Environmental Systems Research Institute,

Redlands, CA.). All data manipulation was conducted using ArcView 3.2. Colorado land cover data are from the Colorado Gap Analysis Program. The original land use data layer contained 52 classes. For the purpose of this dissertation, these land use classes were aggregated into 9 classes. Other data layers acquired from NDIS were statewide county coverage, land ownership coverage and the Colorado Game Management Units coverage.

Method of evaluation

A key factor associated with the degree of success of HPP committees in attaining their desired outcomes would be how these committees organized and operated. Through interviews, committee documents and observation, I determined how each HPP committee operated in relation to the ten factors associated with success outlined on page 55 of chapter two. For example, each committee had a five-year plan that documented a group's common goals and objectives. To determine the effectiveness of the HPP organization and of committee mechanisms, I focused on understanding whether committees were actually constituted in representative fashion. I sought to determine whether committee procedures and decision-making were truly participatory, what challenges committees confronted during their process, and whether there was support for HPP during the initial stages. Finally, I concentrated on determining whether committees met their goal of establishing projects with partners, and how committees implemented, monitored and measured success of their funding projects. My analysis of the overall committee process is divided into the following phases: 1) establishment of committees, 2) setting committee structure and process, 3) gauging stakeholder's initial perceptions, and 4) establishing partners and projects.

To determine how committee activity affected the underlying biology, I focused on understanding the types of projects implemented, the outcomes of the projects on local ecosystems and how the projects related to the underlying causes of the conflicts involving ranchers and natural resource managers. Some of the underlying causes that were identified are: 1) poor forage quality and quantity for big game; 2) wildlife unfriendly fencing; 3) overpopulation of elk and 4) different perceptions of wildlife and habitat management. Besides before and after photographs of project sites, little baseline data was available. Therefore, I based my analysis on interviews and site visits to project areas, as well as published research of similar projects. Also, I assessed whether HPP projects were likely to yield longer-term benefits when

compared with traditional approaches, and whether project outcomes were likely to benefit big game and the parties involved. Through the traditional game damage program, the DOW generally compensates ranchers with fencing material to restore damaged fence to its original condition, or with fertilizer to make reparation for forage loss. I defined long-term benefits as enhanced habitat and riparian areas, improved migration management and enhancement of community knowledge about resource management. In addition, through document analysis, observation and interviews, I determined whether committees considered the surrounding components of the ecosystem when implementing projects.

To determine whether the HPP committees had successful outcomes, I interviewed committee members about whether agreements were reached and implemented, and whether the outcomes provided satisfaction for the parties involved. Improved human interaction is also a measure of success of collaborative ventures and can provide additional benefits to communities. To establish if communication and understanding among stakeholders changed through the HPP process, I elicited committee members' perceptions on this, including the degree to which they perceived that interaction between committee members outside of HPP activity was affected.

Finally, I used demographic data and information gathered from independent sources, such as environmental organizations, to assess trends (that may affect HPP activity) in Colorado.

CHAPTER V
RESULTS AND DISCUSSION

Overview

The results of the study are grouped into five sections. The first section describes the challenges faced by HPP committees and the mechanisms of operation of these committees (hereafter referred as *the HPP process*). The following sections provide data on how HPP activity has affected the social aspects and biological aspects of conflict, the outcomes, including:

- Section 2: community knowledge about resource management
- Section 3: ecosystem health
- Section 4: conflict resolution
- Section 5: communication and understanding between stakeholders

Appendices C and D contain statistical data for context on Colorado's shifting human, livestock and big game populations, as well as data on agricultural land loss and human participation in environmentally related activity.

Unless otherwise stated, all statements are quoted directly from personal interviews with committee members in either 1997 or 1998. To conceal the identity of respondents, yet provide the reader an indicator of the personalities 'speaking,' a unique number was assigned to each committee member. This number follows all quotations. Generally, *sportspersons* refers to any person who fishes or hunts. However, sportspersons who sit on HPP committees represent people who hunt big game specifically. Agricultural landowners are commonly referred to as 'landowners' or 'ranchers' in general HPP terminology, and these terms are used interchangeably in the following text. Agricultural landowners, as defined by Colorado statute, are people who utilize a parcel of land to produce agricultural and/or livestock products for the "primary purpose of obtaining a profit." Landowners on HPP committees represent livestock growers.

The Challenges and Operational Processes of HPP Committees

A key factor associated with the degree of success of HPP committees in attaining their desired outcomes is the way these committees organized and operated. This section will

compare how HPP operated in relation to the factors associated with success previously outlined in chapter three, including:

- Inclusivity of stakeholders
- Stakeholder support of interest group
- Collaboratively designed processes and procedures
- Common goals and objectives
- Jointly defined problems
- Joint fact finding
- Technical and local knowledge
- Collaboratively explored options
- Criteria for decision-making
- Agreement by consensus
- Agreement is implemented and monitored

Implementing and monitoring the agreements will be documented in section four.

To determine the effectiveness of the HPP organization and of committee mechanisms, I focused on understanding whether committees were actually constituted in representative fashion. I sought to determine whether committee procedures and decision-making were truly participatory, what challenges committees confronted during their process, and whether there was support for HPP during the initial stages. Finally, I concentrated on determining whether committees met their goal of establishing projects with partners, and how committees implemented, monitored and measured success of their funding projects. My analysis of the overall committee process is divided into the following phases, 1) establishing committees, 2) setting committee structure and process, 3) gauging stakeholder's initial perceptions, and 4) establishing partners and projects.

Establishing committees

Based on the location of the most habitual wildlife conflict areas, the Division of Wildlife Commission and State Habitat Partnership Council decides where to initiate an HPP committee. Once the location is decided, a regional DOW manager has the responsibility of recruiting committee members and organizing the first local HPP committee meeting.

Each of the 15 committees convened the major stakeholders in a similar manner. BLM and USFS representatives are appointed to a committee from their respective regional office, and the livestock and big game representatives are nominated from their respective interest groups. The DOW officers charged with organizing committees stated that they solicit nominations through various methods, including attending organization meetings, making phone calls to organization members and posting public announcements. The DOW officer collects and tallies the nominations, contacts the individuals named most frequently

and asks the nominees to join the committee. Twelve of the fifteen committees reported having a relatively easy time getting livestock and sportsperson representatives, however three committees experienced delays. At meetings of two different HPP committees, members reported sports organizations as "not real active" in their area and therefore their corresponding nomination process took longer. One committee initially included two livestock representatives who subsequently withdrew. A DOW committee member explained:

> I contacted the Cattleman's, the Farm Bureau, and the Sheepgrowers and asked them for recommendations of who they would like to represent them on the HPP committee. I had a hard time getting a person from the Cattlemen's - two guys started on it but were worried that it could cause problems between them and their neighbors if they came in with a complaint or something and didn't want to sit on the committee. We finally got members, but it took time. (Agency Representative #88, Interview, July 1997)

Inclusiveness

After starting, seven committees reported that they recognized that the interests of users of certain public lands, or the inhabitants of significant tracts of rural land, in their area were not being represented and therefore modified their committee to include additional stakeholders. The Middle Park committee includes a person from the USDI National Park Service and the North Park and San Luis committees have a person from the USDI Fish and Wildlife Service. An Army employee sits on the Arkansas River HPP committee to represent the Fort Carson Military Base, and the Director of the Wildlife Department for the Southern Ute Tribal Council is on the San Juan HPP committee.

The San Luis area encompasses nearly two million hectares, and inhabitants of the Blanca - Ft. Garland area thought that they were not adequately represented on the HPP committee. The committee acknowledged the concerns and helped the landowners establish a 'working group' in the Blanca-Ft. Garland area. The group sends a representative to the San Luis meetings to voice their concerns. At a meeting, a committee member (#70) stated: "There was some animosity on the east because they were not represented by a landowner, so we formulated a working group there and they send a rep to our meeting. We treat their rep

as a voting member." Since the time of this June 1997 interview, a new and separate HPP committee was established in the Mt. Blanca-Ft. Garland area to address local concerns.

Likewise, the Uncompahgre committee area, encompassing 12,924 square kilometers, is mountainous and has limited access by road, and residents of the western end of the Uncompahgre Plateau thought that they were under-represented. The group therefore created a sub-committee, made up of 2 livestock growers, a sportsperson and an agency official, to represent the area. One or more of the sub-committee members generally attends the Uncompahgre committee meetings to voice the views and concerns of their area's interest groups.

The first two prototype committees

Two prototype HPP committees were initiated in 1990, one in the North Fork of the Gunnison near Paonia, and the other in Middle Park, near Kremmling. Both committees started with the members suggested in the HPP guidelines, and the Middle Park group proceeded as such. The North Fork committee, however, created an additional committee, called the 'liaison committee,' which included a local sportsman, a business representative, a banker, outfitters, an orchard owner, and other community representatives. The shared goal of the two committees was to identify local big game conflict areas and suggest possible solutions. The two North Fork committees worked separately, but in the end, the two groups discovered that they had identified similar problems and solutions. The two North Fork groups worked together to create a five-year plan for the HPP committee, called the Distribution Management Plan (DMP). A North Fork agency representative recalled:

> We had the other committee so the people wouldn't think that agriculture was taking over. They went through a totally separate process at the same time as we started. We didn't work together...but we found we came up with similar problems and solutions, so we all decided to end the other committee and proceed with the central HPP committee. We incorporated the liaison committee's ideas with the HPP committee's ideas into the DMP. (Agency Representative #42, Interview, June 1997)

The HPP guidelines require the committee to submit the DMP to the Colorado Wildlife Commission for approval. In addition to the DMP, in September 1990 the Middle Park and North Fork committees submitted a report to the Commission on their procedures,

findings and recommendations. The two North Fork groups enclosed a letter supporting HPP with their reports. A section from the letter read:

> It is unanimous among the committee members that the HPP process is worthwhile, and has opened many doors for communication between landowners, various interest groups and agencies for solving game damage problems. In addition, we have all gained a much greater understanding and appreciation of each other's problems...With continued hard work the program can develop a 'win, win' situation for everyone.

After receiving recommendations and comments from the two prototype committees, the DOW Statewide Evaluation Committee considered HPP a success, and consequently decided to continue the program and develop committees in other habitual wildlife conflict areas of Colorado. In addition, the Wildlife Commission appointed the Division representative from the Middle Park committee as the statewide HPP coordinator to help administer the program and initiate new committees.

Challenges of the initial meetings

All of the committees reported having a challenging time at their initial meetings, however, one of the two prototype committees reported having an especially arduous time building rapport between members. The North Fork committee had difficulty establishing trust between group members during the initial phases of committee development. A North Fork representative recalled:

> At the first meetings, there was no trust at all. It took us six to eight months to build trust. We had the wildlife commissioners there, and all the District Wildlife Managers (DWM) at all the meetings, they know the landowners and know the areas with problems. We had 41 meetings the first year. We did a lot of team building activities...like we went on a couple pack trips and went to dinner with our families...those activities helped a lot, helped us get to know each other. We still do some activities...for some meetings we ride up to a cabin on BLM ground. We went to do the Habitat Summary Plan, and we fished, and helped a rancher move his cattle. There are 3 landowners that have cattle where we're doing projects. (Agency Representative #42, Interview, June 1997)

While a neutral third-party facilitator or mediator is common in collaborative processes, only two committees reported using an outside facilitator for initial meetings.

While there was some tension between the different interest group representatives at the outset, the fact that the parties were willing to participate in HPP voluntarily may reflect the member's belief that a new way of addressing big game and habitat management issues was needed. After the two prototype committees became active, committees established subsequently had members and documents from the North Fork and Middle Park committees, plus the state coordinator to guide them. The state coordinator was hired after the first two committees had formed. Acting as a mediator, the state coordinator frequently facilitated a committee's opening meeting by explaining guidelines, initiating discussion, and sharing information learned by other committees. In addition, committee members reported to me that the previous acquaintance of committee members helped cultivate communication at the initial meetings. One sportsperson stated that there were "no problems in the beginning...everyone already knew each other pretty much, it just took time to get ideas and blend everyone's together. We had lots of meetings" (#48, Meeting, August 1998).

One committee had problems as a result of prior interaction between members. A landowner on the committee, who had years of negative relations with the DOW and neighboring landowners, repeatedly brought past grievances against the Division and neighbors into discussion at HPP meetings. I noted, and committee members reported, that these instances frequently created tension and inhibited open discussion. This issue, combined with less prominent issues between members, caused some members to consider leaving the committee. At a July 1997 meeting, after open and frank discussion, the committee decided to hire a facilitator and have special member-only meetings to discuss the group's goals and problems. Over time, communication improved, and no one left the committee. During an interview, the particular landowner stated, "I think it's (HPP) done a lot to help with the general feeling between the DOW and landowners. There's been an age-old rivalry and I think HPP has helped quite a bit. Now we're talking and understanding each other better, and know that the DOW isn't the enemy" (#23, Interview, December 1998).

Discussion

As stated earlier, scholars in the field of environmental dispute resolution (EDR) have identified several factors associated with the success of a collaborative process. The features that are addressed in this section include:

- Inclusivity of stakeholders
- Stakeholder support of interest group

An important contributor to the success of an EDR process is inclusivity; key stakeholders are represented and motivated to participate, and these representatives have the support of their respective constituent organizations. In the HPP scenario, after 50 years of contention between stakeholder groups over many of the same problems and issues, many of the parties were motivated to find an alternative method to address their conflicts. At the outset, each of the 15 HPP committees convened the main managers of the resources involved in big-game-related conflicts: livestock growers, public resource managers and big game hunters. After recognizing that certain public lands or the inhabitants of significant tracts of rural land in their appointed HPP area were not being represented, committees altered their membership to include additional stakeholders or subcommittees to represent an under-represented area. Moreover, during the start-up process, one of the prototype committees, the North Fork committee, created an additional committee to build community support and acknowledge other potential interests in the community.

To ensure that parties were representative of their specific groups and had the respect and support of their constituencies, each of the 15 DOW committee organizers sought nominations from organization members and the public, and recruited those parties who were most frequently mentioned. The nominated representatives on the committees have the authority to speak and make decisions for their respective interest groups. Likewise, the public resource agencies select officers who have the authority to make and implement decisions for their respective agency, thereby circumventing the need of government representatives to first consult with their agencies for direction, and so building confidence among participants.

After the first two committees were established, the state coordinator served as a mediator, facilitating discussion and explaining guidelines at each committee's initial meeting. The fact that committees were small (seven to eight people), and that participants were acquainted with each other from the outset most likely aided group interaction. When problems arose, committees sought to work through their difficulties. When this proved

impossible to do among themselves, committees sought outside assistance. This demonstrates that members felt invested in the committees and in the viability of the EDR process.

Committee structure and process

Gathering information

Each committee jointly gathered information and compiled the data in a five-year plan, the DMP, for their respective HPP area. The document contains the committee's common goals and objectives, maps of the conflict areas, the Data Analysis Unit (DAU) information, a Habitat Data Summary, a budget projection, management strategies and practices, guidelines for prioritizing proposed projects, and information received from public meetings and questionnaires.

After establishing common goals and objectives, each committee gathered relevant information from government agencies and solicited input from the local populace through questionnaires, interviews, and public meetings. Each committee mailed questionnaires to agricultural landowners in their respective areas to solicit information about wildlife conflicts and locations, and to request comments and suggestions for solutions. In addition, each landowner received information about HPP and an invitation to attend HPP meetings. Committees obtained names and addresses of agricultural landowners from the local treasurer's office. Ranchers did not receive calls or notices reminding them to complete the form. Between the 15 committees, the number of questionnaires returned ranged from 3 to 75 percent, with a mean of 19 percent (Table 5.1). When there are no follow up notices or calls, thirty percent is considered a good return on surveys (Flora, 2001; Pease, 2001; Sapp, 2001). The variance in the questionnaires returned is most likely related to a combination of factors, including, the level of conflict, quality of relationships with DOW officers, negative perception of government programs or questionnaires, the volume of similar mail requests from other sources or lack of awareness or interest in the new program. In general, the percentage of surveys returned was inversely related with the area managed by each committee. The exceptionally high return from ranchers in the North Fork area was most likely related to heightened conflict levels in that area. According to DOW records on fence and forage compensation claims in the traditional program, Delta County consistently topped the list of counties in which claims were most prevalent between 1980 and 1986 (by up to 68

more claims than the second most prevalent county; county data were not available for subsequent years). The North Fork area encompasses the majority of Delta County. Likewise, Uncompahgre's counties, Montrose and Ouray, made the top five counties for number of claims between 1980 and 1986. In addition to surveys, public meetings were held to gather similar information, and to acquaint the local community with HPP and its members. In their DMP, each committee reported public responses to the surveys and meetings.

Table 5.1. The number of questionnaires mailed and returned, and the percentage returned by each HPP committee in Colorado as of July 1997. Source: HPP Committee Distribution Management Plans, 1990-1997.

HPP Committee	Surveys sent	Number returned	Percent returned	Committee area (ha)
San Luis Valley	1,000	43	4	1,952,380
Uncompahgre	400	62	16	1,293,954
Sangre de Cristo	900	56	6	1,071,913
San Juan Basin	2,400	124	5	1,003,460
Yampa/White River	300	32	11	980,066
Northwest	513	64	13	969,153
Gunnison Basin	250	50	20	928,966
Arkansas River	81	30	37	800,048
Middle Park	397	117	30	616,283
North Fork	100	75	75	458,350
South Park	135	37	27	440,455
North Park	250	81	32	419,977
Upper Yampa River	693	21	3	388,826
Grand Mesa	1,050	109	10	382,430
Lower Colorado River	238	44	19	281,902

The public resource agencies within HPP areas also contributed information. Each committee's DMP included data gathered from government agencies on big game populations, distribution and foraging areas, frequent conflict areas, and the status of habitat and forage on public land. Four committees found the available information insufficient for their needs and therefore initiated projects to fund, or combine funding with other organizations, to obtain the desired information. In one instance, the Gunnison Basin committee wanted additional information on the vegetation of the Gunnison Basin area and its relationship to soils and management practices, and therefore collaborated with other organizations to fund the Gunnison Basin Ecological Classification and Inventory Project. Committee members reported that the multiple-year project will provide information on the

current status of plant communities and habitat quality, and on potential plant production to meet livestock and wildlife needs. This committee hopes to gain a better understanding of their area's production capacity so as to make land management decisions that would benefit wildlife and livestock, solve conflicts, and "manage for the best possible ecological condition over the long term" (Gerrans, 1994a). Moreover, Gunnison members reported that the information would be available to the community and public resource agencies for making future land use decisions. The North Park committee is active in a similar project and hopes to map layers of topographical and biological data to develop a landscape management plan that will aid in making land use decisions and in resolving conflicts (NFHPP, 1994). In addition, the Northwest committee contributed to the Northwest Colorado Browse Monitoring Project to collect and evaluate pertinent data from browse communities in their area, and the Yampa/White committee established a project with Dr. Roy Roath of Colorado State University to gather additional habitat data. Other committees mentioned that they might initiate or participate in similar projects in the future.

Supplementary information on big game was also pursued. Ten committees contributed funds for radio-collaring elk to document migration patterns and seasonal use of range areas. The Yampa/White committee wondered how the early hunting seasons affected big game movement in their area. The committee therefore was participating in an elk radio collar project to determine whether archery and muzzleloader seasons pushed elk onto private land early. The Northwest committee questioned the reported antelope population and contributed to fund a new method, a line transect system for counting antelope, which resulted in a more reliable count.

Committee operations

All of the 15 committees selected a chairperson to help orchestrate the meetings. The chairperson is chosen by consensus and, over the 15 committees, ranchers, sportspersons or agency personnel fill the position. Eight of the committees employ a part-time local person to act as a secretary who is responsible for taking meeting minutes, doing mailings, keeping records and contacting members (Table 5.2). Each group of committee members reported that the secretary plays a vital role in committee progress. In the committees without a secretary, one of the agency representatives generally kept records and handled

administrative tasks, sometimes with assistance from within their respective office. All committees tend to have monthly meetings unless there is no business to conduct. The number of meetings committees held their first and second years varied according to the time of year the committee was initiated, the ability to convene representatives and the degree of progress in gathering desired information and developing the five-year plan. The Gunnison Basin and North Fork groups had a challenging time establishing rapport between members, which added to the number of meetings the committee required during its initial year. A Gunnison member reported,

> We met almost weekly for over a year. We rotated secretary and chairperson at each meeting. ...After a while we went out to dinner with our spouses to get to know each other better. And after the second year, we started having a Christmas dinner together. (#22, Meeting, July 1998)

Two committees have annual social dinners with their families, and three committees incorporate a meal into their monthly meetings. The Arkansas and San Luis committees have their meeting at a restaurant either before or after their meal together, while the Sangre de Cristo group generally conducts their business meeting in the morning and have a catered lunch while touring their project sites. Members stated that eating together allows them to discuss daily activities and build stronger relationships.

Meeting attendance is strongly encouraged. As an observer at these meetings, I noted that absenteeism was infrequent. However, during meetings members acknowledged that attending meetings was sometimes a challenge. Landowners said that they sometimes had difficulty attending meetings during busy times, such as haying or calving season. Because of job related travel, the Northwest committee had problems with a member missing meetings, thereby leaving the corresponding interest group unrepresented. The group has plans to discuss an alternate representative to attend when the primary representative is unable to attend. Agency staff stated that they were not allocated enough time to attend HPP meetings. At a meeting, an agency representative commented: "I should be allowed more time to plan and implement projects with HPP. I barely have time to get to the meetings" (#31, August 1998). Committees reported that if a committee member misses a meeting, someone, usually the secretary or chairperson, contacts the absentee, informs them of proposals and gathers

their input before decisions are made. If a non-agency member quits attending meetings or wishes to withdraw from their position, the committee searches for a new member.

The Division of Wildlife funds the program annually by allocating five percent of big game license revenues generated in each committee's area, averaged over the previous three years. For example, if big game license sales averaged one million dollars over a three-year period in one HPP area, the respective HPP committee would receive $50,000. Consequently, each committee's budget is different (Table 5.2). For their five-year plan, each committee creates a projected budget of which a percentage is earmarked for individual categories, such as education or administration. Committees designated the greatest proportion of their funds towards habitat improvement, fence projects, education and research/monitoring. The proposed budgets of the five oldest committees are in Appendix B. The top two categories of all of the committee's proposed five-year budgets are habitat improvement and migration management (fencing), with the percentage budgeted toward habitat improvement often increasing over the five-year period and the percentage toward fencing decreasing over the same time period. Education and research/monitoring received the third and fourth rankings in 13 of the 15 committee's proposed budget plans. This indicates that committees planned to focus their initial efforts on addressing immediate problems, such as fencing, and thereafter on projects with potential long-term benefits, such as habitat improvement and education.

On the basis of self-developed criteria and information, each committee stated that they prioritize projects and funding to make decisions and allocate resources aimed at resolving conflicts and minimizing similar problems in the future. Committees maintain that their procedures are somewhat flexible, depending on the problem, the type of proposal and the money available. Synthesized from committee's comments and five-year plans, common considerations are:

- How will the project resolve the conflict?
- Is the project a long term or short-term solution?
- Will the project benefit landowners, agencies, big game and the public?
- Will the proposed project improve habitat condition
- Is the project a partnership?
- Will the proposed project aid in distributing problem animals?
- Does the applicant/landowner allow low-fee or no-fee hunting or reasonable hunter access to problem animals?

Table 5.2. Individual HPP committee information as of July 1997

HPP Committee	Date HPP area approved (mo/day/yr)	Years operating	Committee members (number)	Estimated annual budget (dollars)	Total meetings since started (number)	Average number of meetings annually	Meetings the first year (number)	Hired a person to monitor projects	Committee secretary	Meal with meeting	Subcommittee
Middle Park	2/15/90	7	8	102,000	59	8	15	Yes	No	Not usually	No
North Fork	2/15/90	7	7	90,000	149	21	30	Some	No	Sometimes	No
Sangre de Cristo	5/1/91	6	7	54,000	58	10	15	Yes	No	Usually	No
North Park	7/17/91	6	8	69,000	86	14	13	Yes	Yes	Not usually	No
Northwest	7/17/91	6	7	116,000	58	10	12	No	Yes	Not usually	No
Gunnison Basin	12/2/91	6	7	145,000	93	16	28	No	Yes	Not usually	No
South Park	9/18/92	5	7	40,000	25	5	10	No	No	Not usually	No
Lower Colorado River	1/15/93	4	7	83,000	25	6	7	No	No	Not usually	No
Yampa/White River	1/15/93	4	7	195,000	34	9	6	Yes	Yes	Not usually	No
Upper Yampa River	5/14/93	4	7	89,000	27	7	2	No	Yes	Not usually	No
Arkansas River	3/11/94	3	8	52,000	34	11	12	Yes	No	Usually	No
San Juan Basin	3/11/94	3	7	158,000	40	13	5	No	Yes	Not usually	Yes
San Luis Valley	5/2/95	2	8	142,000	25	13	13	No	Yes	Usually	Yes
Grand Mesa	7/14/95	2	7	82,000	17	9	7	No	Yes	Not usually	No
Uncompahgre	7/12/96	1	7	140,000	16	16	16	No	No	Not usually	Yes

Discussion

Factors addressed in this section and known to be associated with the success of a collaborative process include:

- Common goals and objectives
- Collaboratively designed processes and procedures
- Joint fact finding
- Technical and local knowledge
- Criteria for decision-making

EDR specialists underscore the importance of allowing stakeholders to collaboratively design and shape the process and ground rules by which the group will attempt to resolve problems; what will be discussed, what information will be needed, how decisions will be made, and how resources will be allocated. This effort gives stakeholders more ownership and greater participation in the process, and builds positive working relationships that help improve communication, decision-making and project implementation.

State organizers of HPP provided guidelines to HPP committees, but created flexibility in the program to allow committees to jointly develop the processes and procedures by which committees operate, make decisions and allocate funds. An agency committee member gave a presentation about HPP at the February 1996 Sharing Common Ground Symposium in Sparks, Nevada. In his presentation, he stated: "One of the beauties of this program is its built-in flexibility. Each committee is not only allowed to come up with new solutions to local problems, they are encouraged to do so. This idea is founded on the principle that people from within the community have better knowledge on how to identify and solve these problems" (Snyder, 1996). The state coordinator generally facilitated a committee's startup process, however, each committee developed its own goals, objectives, plans and budget allocation, and recorded them in their five-year plan.

All of the committees developed the processes and procedures by which they operated, however, there were slight differences between the groups. For example, each committee selected a chairperson by consensus, but only eight committees hired secretaries and two groups had monthly meals together. While all committees encouraged meeting attendance and updated missing members, not all committees found it necessary to meet on a monthly basis. If a member was unable to attend a meeting, each committee had a process by

which to ensure that all committee members remained updated on committee projects and information, and that they were able to comment on proposed projects.

Groups often need more than common goals to work together, especially in environmental conflicts. To define problems and create solutions, parties need to understand and agree on relevant information. After a committee was convened, each of the 15 groups gathered information on vegetation, wildlife, and big game conflict areas from the local community and government agencies to gain a more comprehensive understanding of the area, develop a common base of information from which to make decisions and enhance a committee's ability to manage resources across borders. The merging of scientific information with local knowledge provides not only a broader store of information, but it empowers citizens at the local level, and increases ownership in decision-making (Gray, 1989; Carpenter and Kennedy, 1988; Warren, et al., 1995). Committees collaborated with other organizations to initiate and fund projects to obtain additional information on vegetation, habitat, and big game. If a study or set of data was unclear to members, technical people were invited to HPP meetings to explain the information. The assembled information guides committee decisions, particularly the location of habitat improvement projects, and provides additional information for the public resource management agencies and the local community. A broad base of common knowledge and understanding enhances a committee's ability to make decisions that address some of the underlying causes of the conflicts, and helps establish a more effective means for communities to address related conflicts in the future.

An important aspect of successful collaborative processes is having the resources to fund the initiative. Since the DOW appropriated a percentage of the annual hunting fees to HPP committees, each group had a dependable source of funds to implement projects. Committees mutually agreed upon their budget, and as stated in their DMP, each group designated the greatest proportion of their funds towards habitat improvement, fence projects, education and research/monitoring. Besides establishing operating procedures and budget allocations, each committee developed criteria for prioritizing, accepting and funding proposed projects to resolve conflicts and minimize similar problems in the future. As with

their other procedures, committees stated that their decision process is somewhat flexible, depending on the problem, the type of proposal and the money available.

Initial perceptions of stakeholders

There was not overall support for the Habitat Partnership Program when it started in each area. HPP members stated that initially there was little support from landowners and agency representatives. Eight agency representatives commented that some agency personnel had a less than positive view of HPP and thought that HPP was another program "to try and please the public" and would result in more work. Three agency committee members felt they did not receive support to participate in HPP from their respective supervisors. Other agency officers reported thinking that HPP was just a way for the Division to "buy" support and get relief from public pressure. A DOW officer who was in charge of organizing his area's HPP committee recalled:

> I got a list of all the landowners and asked the DWMs to tell our committee which ones could benefit from HPP...a couple of the DWMs didn't want to have anything to do with it. Many landowners also didn't want to have anything to do with it because the Division started it and they thought it was a Division program...that the Division is trying to buy love and support. There is a lot of dislike of the program within the Division too. Because it uses a lot of funds, a few hundred thousand dollars, while the DOW is already low on staff, equipment, and funds to do projects, for transport and repair, and other things...and HPP has a big budget and can just write out a check ... others are jealous. (Agency Representative #88, Interview, July 1997)

Committee representatives thought that there was a general mistrust of government by landowners in their area when HPP started. At a meeting, an agency representative declared, "there's a big distrust of government, they think we won't really do anything" (#67, June 1998). Another agency employee gave a specific example:

> We sent out over 300 questionnaires and received only 32 back, but most of those people were telling their problems but the problems had nothing to do with HPP. Only 3 were dealing with big game fence and forage problems. We called each person with a relevant problem to see if they would come to the HPP meeting. One was very mad and said "there's no way, I don't want anything to do with your G#% D #* program and you're not going to tell me how to run my ranch,' click. ...for two years we had trouble getting people to

> sign up or even tell us if they were having problems. It was a frustrating time. (Agency Representative #88, Interview, July 1997)

Once a committee becomes established, landowners who have lost forage or damaged fence as a result of big game activity are asked to submit proposals or attend meetings to report their conflicts and propose ideas for solutions. All of the committees reported that initially they had a challenging time attracting landowners to participate in HPP. An agency representative commented, "All of our members are very good advocates of HPP and getting the word out, and the landowners tell each other, but it's hard to get the word out. It's been one of our biggest challenges so far, to let people know that we're here to help landowners and other folks deal with problems" (#85, Interview, November 1998).

At meetings, some agency personnel thought the reluctance to participate in the program was due to a general distrust of government. Landowners on the committees agreed, but thought that part of the problem was also due to landowners past experience with the Division. A landowner commented that the difficulty in receiving game damage compensation before HPP started caused animosity towards the DOW and "many got mad and gave up" (#47, interview, August 1998). Members also mentioned that although they had several public meetings and publicized in the community, several landowners did not know about HPP. Members commented that as time progressed and the groups publicized and completed more projects, more landowners came to the meetings. There was a general consensus among members that the best advertisement was landowners telling each other of HPP. Members from different committees offer support.

> I've gotten a few people referred to me, the latest was a landowner who came to me from one of the other landowners - he was mostly unaware of HPP but he had a problem on his property. ...Through the course of the conversation I got him to come to an HPP meeting and now we're working on a project with him. (Agency Representative #10, Interview, November 1998)

> At first a lot of landowners and people thought that it (HPP) is just another project by the DOW, that nothing is going to happen...they figured that after we had a couple public meetings that that would be about it. A lot found out that it is a way to get something done, but I think it's a long learning process. Some people have had game damage before and think 'I tried that three years ago and the Division came and looked at the problem and nothing happened.'

> Now the word is around that HPP is a place to go to get some things done. (Agency Representative #57, Interview, November 1998)

> I think that's the way most come to a meeting, they talk to someone else who has had a project done or who's worked with us. At first we had a hard time getting anyone to come in because many thought it was just another Division of Wildlife thing. (Landowner #93, Interview, November 1998)

Discussion

Contention between landowners and the government is present in many western states, as was symbolized in the Sagebrush Rebellion and the Wise Use Movement (Hess, 1996). While many ranchers benefit from government programs, some landowners fear government regulations and programs threaten their way of life. The most common denominator that western landowners fear is that the "government, in league with environmentalists, will take some arbitrary action in alleged defense of a species or a wetland or a wilderness area. The result, these people fear, will be lost jobs, lost profits, economic decline and whole communities posting 'going out of business' signs" (Rasker and Roush, 1996, p185). Colorado landowners may have similar fears, and may explain why some of the ranchers were hesitant to become involved in HPP. However, over time ranchers came to HPP committees with their conflicts, a factor which indicates an increased level of trust.

As outlined earlier in the historical perspective of Colorado, since the early 1900s there has been tension between ranchers, sportspersons and public resource managers over livestock, big game and grazing issues. Many committee members stated that there was not much positive communication or interaction between the stakeholders before HPP. A landowner synthesized many of the comments, "Before HPP started, a lot of the communication between the DOW and ranchers was negative"(Landowner #32, Interview, December 1998). The reason state leaders of government agencies and livestock organizations joined forces and created HPP was to address some of these lingering problems. There are numerous government programs, and at the outset, both Division employees and ranchers questioned the legitimacy and commitment of the program's founders. As with any organization, it takes time to become organized and involve the public. As committee members acknowledged, communication between community members is one of the best ways to gain recognition. The evidence that ranchers were now bringing problems

to HPP members and informing other landowners of the program indicates an increased level of trust among community members.

Sachs (1982) uncovered ten obstacles that can hinder government employee participation in collaborative processes. As stated above, HPP agency representatives mentioned two of the obstacles, 1) the perception that EDR processes will involve more work, and 2) a lack of support from the highest echelons of the agency. As with many professions, government agency representatives stated that they are overworked, and at the outset, they felt that participating in HPP would just be additional work. However, at the time of the interviews, all of the agency representatives on the committees supported HPP. There were two agency representatives who thought that their supervisors did not support HPP, nor allow the agency representatives enough time to attend HPP meetings. Lack of support from within an agency can be frustrating and limiting for the agency employees who are working with community residents (Selin et al., 1997).

Establishing partners and projects

I noted, and committee members stated that ranchers with fence or forage damage either present their conflict directly to the committee at a meeting, or they discuss their problem with an agency officer or committee member, who in turn explains the situation to the committee at the next meeting. Together, the committee members and landowners define the conflict and discuss possible strategies to resolve the problem. Ranchers and DOW District Wildlife Managers were mentioned as bringing the majority of conflicts to the committees. The comments from members of three different committees follow.

> A lot of the projects come through the DWMs...they will bring the project to the committee, ...and we ask that the landowner comes to the meeting too, in case we have questions. (Agency Representative #11, Meeting, June 1998)

> The projects come in year around, landowners or others come in and present their idea to the committee...some proposals come through the BLM or Forest Service too. (Sportsperson #35, Meeting, July 1998)

> A lot of the project ideas go through the DOW person in that area because they are out there everyday...that helps put HPP into the bigger picture...it may help 2-3 landowners in an area. (Agency Representative #108, Meeting, July 1998)

Each committee informs the landowner of its criteria to fund a project. Besides legitimate fence damage and forage loss, Colorado agriculture producers are eligible for compensation unless the person unreasonably restricts hunting on his or her land, or if the landowner charges more than one hundred dollars per hunter per season. Conflict areas may be on public land where in the agency resource managers think that the level of wildlife use, or the combination of wildlife and livestock use limits the long-term ecological objectives of the approved resource management plan for the public land area. All committees reported that they strongly encourage partnership for projects. Some projects are partnerships wherein HPP supplies fencing or seeding materials, and the landowner furnishes equipment or labor. In other cases, the committees collaborate with other local organizations that are interested in doing habitat improvement projects or other synergistic endeavors. Committees have combined funds with organizations such as the Rocky Mountain Elk Foundation (RMEF), local weed boards, the USFS and BLM, and the National Resource Conservation Service (NRCS). In addition, committees enter into collaborative projects with adjacent HPP committees. Examples involving three committees follow below.

> Most of the projects are with partners of some sort, either the landowner, the BLM or Forest Service or other organizations like the Weed Board. (Gunnison Basin, Meeting, July 1998)

> We require a 50:50 match on all projects so all projects have partners. (Northwest, Meeting, June 1998)

> All of our projects are with partners, yes, the RMEF and the Grazing Advisory Board are some of the partners. (Grand Mesa, Meeting, July 1998)

Upon receiving a conflict report, committees stated that they generally take field trips to the problem area, or ask agency personnel or DOW managers, to visit the site. After communicating with the landowner and gathering information from site visits, committee members said that they discuss the project at the following meeting. If a committee member is unable to attend the meeting, the secretary or chairperson contacts the missing members to discuss the proposal and get their input. As an observer of several committee meetings, I noted that every member is active in discussing a project and its potential effect on an area. Each committee makes its decisions by consensus. To reach an agreement by consensus,

parties collectively gather information and discuss options until a decision is made that all participants will accept. No one reported disliking the consensus process. If all of the committee members agree, a project is funded. Generally, projects involve various aspects of education, habitat improvement, fencing and hunting.

Discussion

Additional factors identified as being associated with the success of a collaborative process, include:

- Jointly defined problems
- Collaboratively explored options
- Agreement by consensus

Generally, landowners discuss their conflict and options for resolving the problem with the committee members, which improves the chance of finding a mutually acceptable idea and develops ownership in the decision. After visiting problem areas, listening to opinions of agency officers, ranchers and others who work or live in the problem area, and discussing acceptable options, committee members consensually decide whether to fund the project. A decision by consensus allows participants to present their views and helps maintain equality among members. Moreover, through the consensus process, parties are likely to be more creative and take risks as a group than individually (Moscovici and Doise, 1994). Committees continued to be inclusive throughout the decision-making process. At the meeting or when a stakeholder missed a meeting, action was taken to ensure that each person was able to voice his or her view regarding a proposed project.

Each phase of the HPP process involves communication and understanding between participants, which can contribute to strengthening relationships among members of the community. This in turn, can enhance a community's ability to effectively handle conflicts that arise in the future.

The traditional damage compensation program

In relation to the points stated above, the DOW's traditional compensation program differs from HPP. The process, regulated by the Division, generally involves three parties, the landowner, a local DOW manager and a DOW decision-maker. As stated in chapter three, to file a claim for forage loss or fence damage, a landowner has to complete several

forms and document that the property damage is a result of big game activity. Accurately measuring forage loss and the number of big game responsible for damage is difficult. With additional paperwork and a site visit, a Division officer is responsible for verifying the claim. In this context, with no established common goals, base of information or definition of the problem, parties can have different perceptions of the problem.

Instead of exploring options and making a decision by consensus, compensation options in the traditional program are limited by DOW regulations and decisions are made in top-down fashion. The claim is submitted to the state DOW Commission officer, who decides whether compensation is justified. If compensation is awarded, the compensation is generally in the form of fencing material to restore damaged fence to its original condition, or as fertilizer to make reparation for forage loss. In general, the process does not address the underlying causes of the conflicts, and as a result, it is not uncommon for problems to recur in the same location.

Sharing Information on Resource Management

In recognition of the diverse backgrounds and interests of Colorado residents, each of the fifteen HPP committees has a goal to increase the knowledge and skills of local people in natural resource use and management, which, in theory, can aid in addressing some of the underlying causes of conflicts involving big game. In this section, I focused on understanding the types of projects implemented, and how the projects related to the underlying causes of the conflicts involving big game and livestock. Generally, educational projects are not funded or initiated in the DOW's traditional game damage compensation program.

Committees developed a variety of educational projects aimed at increasing community knowledge about natural resource management. Committees sponsored workshops in holistic and ecosystem management, grazing systems, land management strategies, such as conservation easements, and other management actions that aim to improve ecosystem health and meet the economic and social needs of communities. In addition, committees attended and donated funds to other educational seminars and conferences, and created educational brochures. Members mailed HPP committee newsletters to landowners and other community members, made public service announcements, and

attended fairs and organizational meetings to inform the public of HPP activities and resource management initiatives.

Educational seminars and workshops

As of July 1997, eight committees had sponsored 31 seminars with a total of 1085 participants, an average of 35 participants per seminar. Two of the oldest committees, North Fork and Sangre de Cristo, held the most seminars, eight and ten respectively, while the remaining six committees sponsored between one and three seminars.

One of the topics that HPP wished to address was grazing and range management. A common problem encountered in range management is that people frequently have different perceptions of range conditions and different levels of understanding of how grazing affects plant growth. Agency representatives stated that interpretations of range conditions vary within an agency, but more frequently perceptions differ between agencies or between an agency officer and the public.

While it is not uncommon for Division employees to be discontent with how public range is managed, Division officers claimed that often DOW employees do not have a good understanding of the effects of grazing and range management. At a meeting in July 1997, a DOW manager said that one of the reasons his HPP committee was having a seminar was "to get the DOW more up to date on range management." Besides the contrasting opinions within and between agency employees, ranchers and public resource managers frequently disagree on range conditions and management. In response to public pressures and government mandates, public land managers are responsible for altering livestock grazing numbers or systems on public land. Livestock growers, however, may be hesitant to change their management strategies. An agency officer explained:

> In some areas, we have 3rd and 4th generation ranchers who are used to looking and doing things the way they have been - the area has been like this since they can remember. So sometimes we have to bring in professors or extension people, or someone in a neutral position, to try and explain the conditions to the ranchers and convince them that things need to change. (Agency officer not on an HPP committee, Interview, October 1998)

In recognition of the different interpretations of range conditions, five committees hosted seminars on range and habitat management and monitoring. These seminars,

conducted by Dr. Roy Roath, of the Rangeland Ecosystem Science Department at Colorado State University in Fort Collins, included information on designing resource management strategies, interpreting grazing effects on plant growth, collecting baseline information and establishing quantitative and qualitative assessments of plant communities in the field.

Season long grazing systems was another topic that committees addressed. Utilized for decades, season long grazing remains a common practice on both public and private land in the United States. In this management scheme, livestock are released in a pasture during the late spring or early summer and are left to roam and forage until the fall when the animals are removed. Under this system, livestock can over graze certain areas, such as riparian areas, and underutilize forage in other sections. Over time, overgrazing can inhibit plant growth and leave soil barren and susceptible to erosion. Meanwhile, unused hilltop forage can become degraded and less palatable to livestock or big game species.

Committees were interested in learning different approaches and techniques for grazing and range management to improve forage production and habitat, and in developing a common understanding of grazing management between local people. Moreover, committee members stated that they were now looking beyond their respective boundaries in an attempt to manage the HPP area as a system, and therefore wished to gain knowledge about how their decisions and actions may affect the interacting components.

To help satisfy these interests, nine committees sponsored a Holistic Resource Management (HRM) seminar for committee members, landowners and the general public. Allan Savory developed HRM in his effort to reverse the loss of biodiversity in game parks and ranches of Africa (Gerrans, 1995b). HRM provides a framework for people to apply a holistic approach to making decisions about the management of financial, human and natural resources, while "working toward economic, social and environmental balance in a responsible manner" (Savory, 1998). HPP committees hired a Colorado HRM instructor who centered the seminars on participant needs. In an August 1995 HPP newsletter, the HRM instructor stated that the seminars will help people learn how to:

> Increase the productivity of the land, reduce conflicts between wildlife and livestock and enhance wildlife habitat, understand the real reasons for loss of biological diversity and reverse this trend, reduce problem plant populations,

> heal gullies and eroding streambanks, plan and achieve profit and restore profitability to agriculture, reduce risk, enhance wildlife populations, identify and capitalize on real wealth, (and) make decisions which are simultaneous socially, environmentally, and financially sound. (Keogh and Associates in Gerrans, 1995b)

Committees advertised the HRM seminars in local newspapers, fliers and HPP newsletters to attract community members to the workshops. A landowner recalled, "We had HRM classes. All of our committee members went so they could learn how to apply the information, and we advertised in the community and encouraged others to go" (Interview, #20, July 1997).

Overall, committees said that they were pleased with the attendance and the information provided at the seminars. The four oldest committees, the Sangre de Cristo, North Fork, North Park and Middle Park groups, reported that their HRM seminars were so well attended that they had more than one. At a July 1998 meeting, a North Fork committee member (#38) commented: "All of our seminars were full, with a variety of people, government people, environmentalists, landowners, ranchers, and subdivision folks ...we had 3 HRM seminars...and had about 30 people at each one." Gerrans (1995b) received positive comments from HRM seminar attendees and reported a few responses in an HPP newsletter:

> I have been to a number of courses over the last few years and this is by far and away the most beneficial course I have been to. Rancher

> This is the first concept I have seen that could solve the world's problems as we know it. I would recommend this course to anyone involved in ranching. Rancher

> The course gave me direct applicability to my needs. DOW officer

The seminars provide a forum for people of diverse backgrounds to discuss similar issues. Originally, the committees stated that they held HRM seminars to provide HPP members, landowners and land managers with information and alternative ideas to aid them in making land management decisions. After attending the seminars, however, members stated that they thought that others could benefit from the information and therefore

expanded recruiting efforts to include legislators, environmentalists, city planners and others. Two members of different committees made the following comments.

> We had HRM seminars with Miles Keogh and had all types of people come from the Government, the public, community and politicians, we even had a senator attend the seminar. We keep inviting and involving the legislators so they can learn about what we're doing. From the DOW and landowner perspective, most people west of Interstate 25 are aware of HPP... (Sangre de Cristo #75, Meeting, August 1998)

> In 1996, we had a 3 day HRM seminar with about 40 people...we had a good mix of people, with landowners, public agency folks, county commissioner, and a county planner, people from the Land Trust and business folks. (Middle Park #30, Meeting, June 1998)

Committees did not record information on whether those who attended HRM seminars applied the information to their land management decisions and practices. Committees who had HRM seminars said that they try to incorporate HRM into their projects and decisions. Six committees reported projects with agencies and ranchers applying HRM models of grazing systems. In contrast to season long grazing, ranchers who apply HRM generally implement a deferred or rotational grazing system in which livestock are grazed intensively for short time periods, depending on pasture size and vegetation, and then moved to a new area to graze. With this method, livestock tend to utilize forage more evenly, and the rotation provides the vegetation a period of rest and regrowth. As of July 1997, six committees had grazing management projects on 49,365 hectares of land.

The Middle Park committee is collaborating with a rancher who is practicing HRM on 2,400 ha. In exchange, the landowner opens his ranch for people to conduct research, monitor vegetation and collect data. The people involved with this project hope to improve public opinion of grazing, "prod agency changes in grazing management to improve habitat and forage conditions for livestock and wildlife, and to affect the water cycle and begin perennial stream flow again" (Gerrans, 1996).

Collaborative HRM grazing projects on public land have provided educational benefits to public agency officers and local community members. In one instance, the USFS in the North Fork region accommodated permittees' HRM grazing schedule when they

updated the West Elk management plan. Permittees are ranchers who have lease permits to graze livestock on public ground. The USFS and the permittees shared information on HRM practices with the local populace and involved locals in rewriting the plan. A local urban resident involved in rewriting the plan commented, "It was a valuable process. It has brought together a really diverse section of the community in a positive way and has provided a framework for cooperation," and a different participant commented about HRM, "It's broader than grazing – it's an approach to problem solving" (NFHPP, 1994).

Two committees reported having seminars on the Ranching for Wildlife program. The program, initiated in 1985 by the DOW Commission, provides incentives to encourage large landowners to manage their property to benefit wildlife. To participate in the program, landowners must have 4,800 contiguous hectares, develop a habitat management plan with a Division officer and allow public hunting. The DOW decides the number of hunting licenses that are allowed on the participating ranch. A Gunnison Basin committee member stated:

> We had a Ranching for Wildlife habitat seminar... to provide information about the cooperative efforts possible between agency and private enterprises to aid ranchers financially with hunting elk and deer on their property. About 40-50 people came. (#17, Meeting, July 1998)

As of July 1997, eight committees did not sponsor a seminar, but each of the groups stated that they planned to have one in the future. Being a relatively new committee and finding time were the reasons committees gave for not having had a seminar. In a July 1998 interview, an Arkansas River member (#7) stated, "that's probably the area where we're slacking the most... everything takes time."

Booklets and brochures

By July 1997, twelve of the fifteen committees had developed 37 brochures to distribute to the public. Committees created an informational brochure about their respective committee's goals and objectives, and other types of brochures that inform the public on such issues as fencing, wildlife and living in rural areas.

Fence damage from elk and deer is one of the main problems landowners have with big game. Big game frequently loosen or detach top wires while jumping fences, and a herd of elk is known to literally go through a fence, dismantling wires and several meters of fence.

For many ranchers, fixing fence is a habitual need. To address the problem, HPP has been employing new fencing technologies that provide easier crossing for big game, which should therefore reduce fence damage. In contrast to the traditional four-strand barbed-wire fence, HPP committees stated that through projects and education, they encourage landowners to try alternative fences that are wildlife friendly and low maintenance. Moreover, the members stated that they learn from their projects and communicate fencing ideas, problems and successes with others through conversation, annual reports and newsletters. The Sangre de Cristo group created a fencing brochure titled, 'Fences for Man and Beast: An illustrated guide to friendly fencing for livestock and wildlife.' The brochure contains several illustrations of various types of fences and information about HPP. The committee distributes the booklet to people with fencing projects or questions, and places the booklet in agency offices for public access. Other HPP committees reproduced and used the Sangre de Cristo fencing booklet.

Many of the people moving to Colorado are building homes on small rural acreages, and may be unfamiliar with how their actions and decisions on home building, water use, livestock grazing and pet care can make impacts beyond their own property. Concern over the effects of the rising number of people and houses led the Gunnison Basin and Sangre de Cristo committees to contribute to the development of an educational booklet on various environmental issues for new residents. The Sangre de Cristo booklet, called, "Landowning Colorado Style," includes information on the management of soils, weeds, water, riparian areas, grazing, trees and wildlife. Moreover, the brochure contains a list of contacts for people to obtain additional information on each topic. A Sangre de Cristo member commented:

> The committee wanted to focus on education from the beginning, so we did brochures and did a rural living handbook with the NRCS. We felt that many people didn't understand a lot about vegetation and wildlife, and other issues, and we wanted to help the people learn what the problems are and to help them solve their own problems. (#80, Interview, July 1998)

Likewise, the North Fork committee created a one-time 12 page "newspaper" called "Living with Elk." The paper contains information on the history and biology of elk and the effects of weather big game, as well as HPP objectives and projects. Additional articles

explain grazing and hunting on public land, rejuvenating habitat, planning future land use and avoiding elk and deer on roadways. At a June 1998 meeting, a North Fork representative said, "We did a 'Living with Elk' brochure to give people an idea about elk and we mailed it to all post boxes in the area." Other HPP committees have distributed or used the North Fork 'newspaper' for educational purposes.

Noxious weeds are a major concern in Colorado. There are sixty-eight plant species identified on Colorado's list of noxious weeds. Noxious weeds are aggressive non-native species that compete with other vegetation for moisture and nutrients. The weeds can rapidly displace native plant species that provide habitat and forage for wildlife and livestock. Five of the top ten noxious species listed are Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), field bindweed (*Convolvulus arvensis*), spotted knapweed (*Centaurea maculosa)* and Russian knapweed (*Centaurea repens*). Committee members mentioned several instances when human ignorance contributed to the spread of noxious weeds, such as people picking the flowers of weeds and spreading the seed, or cultivating the weed species in home gardens. After attending a Weed Management meeting in Denver, a DOW officer commented in a HPP newsletter:

> It was interesting to listen to many of the controversies and public outcry weed managers had to deal with last year. Some of the more controversial ones were media enhanced protests and human chains around a musk thistle patch (the protestors were going to eat the stuff). Again the way to get the word out is through education. (Gerrans, 1997)

During a meeting, a Middle Park committee member contributed:

> One of the big problems with weeds is, while we're trying to get rid of them, some people are growing and cultivating them in their garden or selling them as ornamentals... The weed board is mapping weed locations on the computer and doing more education about weeds in the community. (Agency Representative #31, Meeting, June 1998)

Eight committees were active in attempting to control noxious weeds by educating the public, doing projects, and donating to organizations with similar weed management goals. For example, the Gunnison Basin committee, in partnership with the local NRCS, produced a brochure on weed identification and control methods. The brochure informs

readers about noxious weeds, why people should care and what people can do to help reduce the spread of noxious weeds. To reduce conflicts, initiate collaboration and lower costs, the Upper Yampa committee partnered with the NRCS to purchase a weed sprayer and a grass drill for community members to share. A committee member explained,

> We bought a weed sprayer with the Soil Conservation Service to share in the community, to create a lot of good will and alleviate conflict. ...it will travel by word of mouth if people will share it with their neighbors. ...There's a minimal cost for rental, but the range drill is not to be used to plant a crop. (Upper Yampa Committee Meeting, July 1997)

Unique educational endeavors

Aside from brochures and seminars, committees developed other ideas to inform and educate the public on HPP and resource management. The Gunnison Basin group initiated several new ideas. A member reported:

> We made a video about agriculture and wildlife and how people can live with both, and we did some public service announcements on television to advertise a little about HPP and what we are doing, to try and get more support and people involved. ...we give out two $500 scholarships to students going to college to pursue fields in agriculture or wildlife or other natural resource related fields. (Agency Representative #22, Interview, July 1998)

Three of the older committees developed some informational activities to both educate and involve the public. The Arkansas River committee conducted a six-hectare burn for the purpose of building public relations and education. The committee publicized the burn with the hopes of increasing public knowledge and awareness of the benefits of controlled burns. The committee thought this project was a success and plans to have additional burns in the future.

The North Fork committee turned unplanned fires into educational endeavors. After a burn occurred in the North Fork HPP area, the committee held public meetings to educate the public on fire use and to inform affected landowners of restoration options. Moreover, the members worked with agency personnel and private landowners on rehabilitation efforts. On a separate venture, the North Fork committee established a collaborative project with local agencies, landowners and high school students to reseed the Wake and Missouri burn areas.

As part of the project, local students assisted with taking soil samples and establishing seed germination plots. The Paonia school district partnered with the North Fork committee on an educational project. The partners developed seed germination test plots to determine the growing potential of various plant species, and used the plots to show community members the species that can grow successfully in their area (Gerrans, 1994b).

Engaging sportspersons

Committees attempted different measures to keep sportspersons engaged in HPP. The North Fork committee organized a public meeting for local hunters and 'non-hunters' to discuss hunting issues and how the groups could "work more effectively on issues of common interest" (NFHPP, 1997). The Sangre de Cristo committee held a sportsperson's meeting with DOW Director, John Mumma, and his staff members. The committee mailed invitations to various groups and solicited questions for Mr. Mumma to answer during the meeting. The committee reported in an HPP newsletter, "The meeting turned out to be one of the best held, both in attendance and in information that was presented. Participants felt that their questions were answered fully and completely and that the meeting was a resounding success. It might well serve as a model for other meetings of this type in other areas of the state" (Gerrans, 1997a).

In August 1998, the Sangre de Cristo committee was in the process of developing a brochure focused on sportsperson's issues. At the meeting, a committee member (#76) commented: "We want to develop a brochure for sportspersons on management programs... and how distribution management hunts work."

Efforts were made to help amend relations between ranchers and hunters. Based on prior experience, many landowners hesitated to allow hunters on their property. To address this issue, the Gunnison Basin committee produced a brochure that encourages good sportsman ethics. In addition, the Gunnison Basin committee bought dumpsters and placed them along access roads in hopes that hunters would throw garbage in dumpsters and not on the ground. At a July 1998 meeting, a committee member (#20) recalled, "During hunting season, we put out a dozen dumpsters along well traveled hunting roads for hunters to put their garbage in and help build rapport with landowners and sportspersons. We couldn't get

enough dumpsters out, they were always full last year and we emptied them once a week. It worked really well and we're planning to buy more dumpsters and do it again."

Displays

Committees attend conferences, meetings and other events to raise public awareness of natural resource issues and HPP activity. At a 1998 meeting a North Fork committee member (#41) stated, "We have a display built for county fairs, public events and we were at the art festival, to inform people about HPP ...and we have brochures we give out about HPP." The Northwest committee had a display at the Moffit County Fair, and a Northwest member reported, "It went well and we saw a lot of landowners, ... and we got some activity from it" (#58, Interview, July 1998).

As part of the educational endeavors, committees invite the public on project tours and give presentations at organization meetings. A North Fork committee member stated:

> We went to different meetings, like the Cattleman's and Archers, and gave presentations about HPP and what we're doing. A lot of education is just one on one stuff - communication between each other, and when ranchers come to meetings...and we go on a lot of field trips, of grazing management, vegetation manipulation, weed control and that and we invite people to come along. (#38, Meeting, June 1998)

Self learning and assessment

Sharing information is a common practice throughout the organization. The people involved in HPP frequently seek new methods, knowledge and ideas to improve their program. Besides disseminating information to the local populace, I noted, and committee members stated that they actively pursue new information to support their decisions and further their goals. If committees wanted additional information, HPP representatives questioned local community members, organizations, other HPP committees and the state coordinator, and invited the individuals to share the information at an HPP meeting. If desired information was not available, many committees initiated projects or combined funds with other organizations to obtain the data.

Members of different committees frequently interact to discuss HPP and learn from each group's activities and problems. A Lower Colorado representative reported, "We talk a lot with the Yampa committee members because they're doing things a little bit differently

than us" (#24, Meeting, June 1998). In their initiation stage, the Grand Mesa group said they contacted the adjacent North Fork committee to ask advice, discuss experiences and tour North Fork's projects to gain a better idea of the types and results of various projects. Moreover, committees invite other HPP committee members and the public on field trips and tours of their projects. Committees also initiate and fund projects together. An Arkansas River representative recalled:

> We took a tour of a Sangre de Cristo HPP project, it was a roller chop and burn project - so we talked with them to see what they did and how they did it and talked with the landowners about what they thought. We had 5 people from our committee there. ...There were over 30 people there from DOW, FS, BLM and landowners and all sorts. I think there's a lot of interaction between committees. We're in the process of putting together some workshops on conservation easements with the Sangre group. (#3, Meeting, July 1998)

HPP state coordinator

There was overall consensus among committees that the HPP state coordinator plays a vital role in the administration and organization in HPP. A key factor involved in committees' initial phase has been guidance from the coordinator. Acting as a mediator, the state coordinator frequently facilitated a committee's opening meeting by explaining guidelines, initiating discussion, and sharing information learned by other committees. After the initial phase, the coordinator continued to work extensively with HPP committees throughout the state. The coordinator shares relevant information with committees through newsletters, telephone calls and meeting attendance, and periodically attends each committee's meeting to learn what is occurring in the area and what problems may exist. Between April 1993 and August 1997, the coordinator mailed 17 seasonal newsletters to committee members and interested parties in Colorado and other states. Each newsletter contains information on relevant state and national activities and legislation, literature, upcoming field trips or workshops, issues brought to the state committee and information about ongoing HPP projects. In July of each year, each committee submits a report to the state coordinator that documents the types of projects completed, the number of acres of private and public land the project impacted and the amount of money expended on each type of project. In addition, committees periodically inform the coordinator of new projects and

attendant results. The coordinator stated that he attends legislative sessions to keep committees abreast of state legislative changes. By a combination of reading and site visitation, the coordinator said he learns what agencies and organizations in other states are doing for ecosystem and grazing management.

In February of each year, the state HPP coordinator organizes a two-day meeting for committee members and interested parties to gather and inform one another of their activities, successes and problems, and listen to educational speakers on a variety of topics. HPP began holding the annual event in 1993. Attendees generally spend the first day listening to speakers, including professors, ranchers and representatives from government agencies and agricultural and environmental organizations. The speakers present information on various topics, including: habitat management practices, conservation easements, demographics, and resource management programs and partnerships. During the second day, HPP members share information on the success and challenges of the previous year. In addition, members of similar interest groups (i.e. sportspersons, BLM, ranchers) convene to discuss issues and ideas for improvement. At the end of the meeting, attendees are asked for suggestions on topics and speakers for the following year. At the 1997 meeting, those in attendance thought that HPP should broaden its scope of interaction, and that the HPP coordinator should invite "recreational people," "anti-ranchers" and "environmentalists" to the next meeting. There was a general consensus among the committees that the annual meeting was a highlight.

> Its great to have the state meeting and get together with other folks on committees to hear about their problems and the projects they're doing. (Agency representative #17, Meeting, July 1998)

> I think a big positive for the landowners, well for me anyway, is I especially enjoy the annual meeting because I meet people from around the state, and talk with them and hear about other committee projects, and they have interesting speakers and I learn a lot. (Landowner #94, Meeting, August 1998)

The person appointed as state coordinator in 1991 remained in the position until October 1999, when a severe accident caused him to retire early.

Discussion

While it may not be possible to accurately measure the degree of success of the educational activities sponsored by the committees, one cannot discount the value of educational endeavors in addressing some of the underlying misunderstandings and causes of local conflict. At the outset, committees acknowledged that perceptions of range management frequently differed between agencies and even between committee members. The continuous influx of newcomers to Colorado, with various levels of understanding, knowledge and interests, adds another dimension. The Denver Post recently conducted a study using Internal Revenue Service migration data from 1990 to 1997, and found the majority of people moving to Colorado's rural areas are from urban settings (Olinger, 1999). Kellert (p. 42, 1996) reported that many urban residents have a "highly romantic appreciation of the natural world" and tend to support nonconsumptive use of natural resources and frequently oppose hunting and grazing on public land. Committees recognized the different perceptions and understanding of people in the community towards range and big game management and how this contributes to big game conflicts, and tended to focus their educational projects to minimize the differences.

Education may enable people to understand the multiplicity of perspectives different groups have regarding issues relating to their local environment. Exposing people to the views and circumstances of others fosters understanding and appreciation of others' viewpoints, which can lead to fewer misconceptions and hostility, and result in more effective communication. With a broader comprehension of the complexities of the ecosystem and its interacting components, people can discuss issues more fully and build the community's capacity to constructively handle complex problems in the future. Working together, people can develop more creative alternatives that satisfy the interests of more community members. In other words, the convening of people during educational activities can build social capital within a community, which, in turn, can be used to enhance natural capital, such as ecosystem health.

The activities pursued by HPP committees have proven some of these conclusions. Committee members frequently mentioned that the HRM seminars not only broadened their perspective on land management, but also aided in giving other segments of the community a

better understanding of grazing and range management. For example, some people perceive all grazing to be detrimental to the natural system, when in fact, certain grazing systems can enhance the local ecosystem. At a meeting, an agency member recalled that on one of the HRM range management tours, a "big environmental activist" came. "At the beginning of the tour, he basically thought most of them (ranchers) were destroying the habitat, but by the end of the day, he was on their side and understood how grazing can be used to improve habitat" (July 1998).

Grazing issues provide another example of successful communication transfer. For years, the Forest Service and BLM in many areas have been trying to adjust grazing systems and allotments, and agency representatives generally encountered resistance from landowners. After attending HRM seminars and speaking with other ranchers, some landowners, either independently or in conjunction with HPP, changed their grazing system from continuous grazing to deferred and rotational methods. Landowners, public land managers, the public, and big game have benefited from the more efficient use of forage. An agency member stated, "...now ranchers are even coming to me and talking about doing different grazing management practices" (#49, Meeting, August, 1998).

The educational ventures pursued by some HPP committees will likely prove beneficial, especially in light of Colorado's growing human population. These initiatives may serve to increase the knowledge and awareness of community members about the issues involved and how human activity may affect wildlife and habitat. The projects exposed people to different components of the system, such as weeds, grazing and fire, and how they can be managed in a system to contribute to a healthier environment. Studies have shown that education in ecological principles, and programs aimed at increasing people's awareness and understanding of the interdependence of the ecosystem contribute to people changing their values and interests, and supporting and acting towards initiatives to protect the environment (Diduck, 1999; Smith, 1995; Corson, 1995; Kellert, 1996). Education initiatives help in providing and establishing a common base of information for people to make decisions and take action.

The effects of HPP on the Underlying Biology of Managed Areas

Overview

With direction from HPP guidelines, individual committees developed a variety of projects aimed at resolving and minimizing conflicts involving fence and forage damage caused by big game. To determine how committee projects affect the underlying biology of managed areas, I focused on understanding the types of projects implemented, the outcomes of the projects on local ecosystems and how the projects related to the underlying causes of the conflicts involving ranchers and natural resource managers. Some underlying causes are overpopulation of elk, wildlife 'unfriendly' fencing and inadequate habitat for big game. Moreover, I assessed whether HPP projects are likely to yield longer-term benefits when compared with traditional approaches, and whether project outcomes are likely to benefit big game and the parties involved. Since HPP's inception in 1990, the 15 HPP committees have embarked on projects involving management of wildlife movement, population control and habitat improvement. The following section is separated into these three categories and includes data and analysis on the projects.

Management of wildlife movement

Tools for managing the transit of wildlife through private property include: new fence, repaired fence, wildlife crossings and exclusionary stackyards (stackyards are fenced enclosures that prevent big game or livestock access to haystacks). Committees have stated that the purpose of the fencing projects is to build wildlife-friendly fences that help facilitate big game crossing while reducing long-term maintenance and damage. Fencing materials for repair and stackyards are part of the traditional game damage compensation program.

Between the 15 committees, 193 kilometers of new fence, 66 stackyards and 60 crossings have been built since 1990 (Table 5.3). The Gunnison Basin and Middle Park committees constructed the greatest amount of fence, while the South Park and North Fork committees ranked the highest in number of ranchers assisted with fence repair. The variance in the number of fencing projects reflects the length of time a committee has been functioning, the funding available, and the number of ranchers who contacted HPP committees with problems. The first committees were started in areas with the highest

Table 5.3. Fencing projects completed by the 15 HPP committees as of July 1997

HPP Committees (years in operation)	New fence constructed (km)	Stackyards built (number)	Ranches assisted with fence repair (number)	Gates provided (number)	Crossings Built (number)
Middle Park (7)	47.5	7	7	30	1
North Fork (7)	14.0	0	146	4	31
Sangre de Cristo (6)	8.0	0	8	0	0
North Park (6)	19.2	31	55	26	2
Northwest (6)	15.2	2	40	8	0
Gunnison Basin (6)	36.0	11	13	7	4
South Park (5)	5.6	0	73	0	0
Lower Colorado River (4)	6.4	10	37	3	0
Yampa/White River (4)	3.2	0	0	0	1
Upper Yampa River (4)	10.4	5	30	22	0
Arkansas River (3)	2.9	0	61	0	0
San Juan Basin (3)	2.2	0	27	0	18
San Luis Valley (2)	21.8	0	0	0	3
Grand Mesa (2)	0	0	6	0	0
Uncompaghre (1)	0	0	0	0	0
Totals	192.4	66	503	100	60

incidence of habitual conflict. The majority of committees reported that one of their biggest challenges was informing the public about the purpose of the committees, and in attracting ranchers with relevant game damage problems. As documented in section one, committee members reported that, at the outset, few ranchers came to HPP due to a combination of factors, including, ignorance of the program, dislike or distrust of government programs and the number of conflicts in the area. The North Fork region has the greatest number of small vegetable and fruit growers in its region, which is a reason why the North Fork committee has assisted such a large number of ranchers with fence repair. Likewise, the reason the San Luis committee has constructed a large amount of new fence is most probably related to the huge area the committee covers (1.9 million hectares), and the large number of vegetable growers in the region. The high number of ranches assisted in the South Park and Arkansas River areas may be an indication of greater pressures being placed on big game due to increasing human populations. Two counties in the South Park and Arkansas committee areas (Teller, Park) had the first and third highest percent change in population between 1990 and 1997; Teller had a 70 % change and Park had a 60% change in population.

Table 5.4 Comparison between number of initial surveys sent and returned by each HPP committee and number of ranches receiving fence assistance.

HPP Committee	Surveys sent	Percentage returned	Ranches assisted with fence repair	Percent of ranchers assisted in relation to number of surveys sent	Percent of ranchers assisted in relation to number of surveys returned
Middle Park	397	29.5	7	2	6
North Fork	190	53.2	146	77	145
Sangre de Cristo	900	6.2	8	1	14
North Park	250	32.4	55	22	68
Northwest	513	12.5	40	8	63
Gunnison Basin	250	20.0	13	5	26
South Park	135	27.4	73	54	197
Lower Colorado	238	18.5	37	16	84
Yampa/White	300	10.7	0	0	0
Upper Yampa	693	3.0	30	4	143
Arkansas River	212	31.1	61	29	92
San Juan Basin	2400	5.2	27	1	22
San Luis Valley	1000	4.3	0	0	0
Grand Mesa	1050	10.4	6	1	6
Uncompaghre	400	15.5	0	0	0
Total	8928	18.7	503	5.6	50

During their initial startup phase, committees mailed questionnaires to agricultural producers in their area of purview (Section 1). The number of surveys returned could be related to the amount of damage occurring as a result of big game activity, i.e., to the number of ranchers experiencing conflict. Committees did not keep a record of the number of ranchers who brought conflict-generated proposals to HPP meetings, however, they did document the number of ranches receiving assistance with fence repair. Two committees provided assistance to over half of the ranches within their management area. There is no clear indication that the number of surveys returned is related to the number of ranches with fence damage problems from big game activity (Table 5.4).

Discussion

The traditional game damage program generally supplies fencing material for a landowner to repair a fence, commonly of barbed-wire, to its original state or to build a fenced stackyard. In contrast, HPP committees went beyond repairing fence in the traditional manner to testing and implementing more wildlife friendly fencing aimed at reducing long-term maintenance and damage, and providing easier crossing for big game. HPP fencing projects have included various combinations of barbed wire, hi-tensile, electric and let-down fences. Let-down fences are temporary fences near common migration routes that can be easily removed or laid down when not needed. Likewise, gates have been installed and are left open during nonuse periods to ease big game travel. Committees required that fence heights not exceed 95-105 cm; a height that allows the passage of big game animals yet is adequate to contain livestock. One of the main frustrations ranchers and Division officers have had with the traditional game damage compensation program is the amount of time and paperwork involved. In order to reduce paperwork and accelerate compensation for claims involving trivial fence damage (less than $250), committees created vouchers for ranchers to purchase fencing material in lieu of a filing a claim.

A new fencing method that committees found effective involved the use of white vinyl strip – a hi-tensile wire encased in a two to ten centimeter wide white plastic strip - as the top strand on a fence. There have been problems with big game herds going through fences rather than jumping the fences. With the white vinyl strip fences, however, elk and deer tend to avoid or jump the fence rather than go through it. It is thought that big game react in this manner because the white vinyl strip is more visible to the animals than a plain wire. Black plastic was tried but was not as effective. Big game herds tend to take similar annual migration routes. Based on knowledge gained from landowners and agency officers, and from tracking herds, committees installed special crossings to facilitate big game passage on major wildlife migration routes.

Committees reported that the majority of fencing projects were considered successful, but fence designs sometimes needed modification for local conditions, such as snow depth or terrain. For example, in one instance, 0.4 km of hi-tensile fencing was converted to let-down fence because snow load had broken the hi-tensile wire. Committees share their learned

experience with the public and other committees through personal conversation, tours and documents such as newsletters. In the July 1993 newsletter, the state HPP coordinator wrote:

> On a recent tour to look at the three wire high tensile fence constructed in Middle Park last fall, ...a livestock producer said that this was the first time in 45 years that the fence in that location was not going to have any broken wires to be repaired. Drifted snow had covered a good portion of it, along with elk and deer crossing it, and it stood up well. The day of the tour we did see deer jumping it with ease.

With their fencing projects, HPP committees go beyond simply repairing fence, and consider some of the underlying causes of fence damage, such as migration patterns and the ability of big game species to see and jump fences. Improved fencing strategies should result in longer-term benefits to people and wildlife than the traditional approaches. The theory behind the new fence designs and heights is that fewer animals will be injured crossing necessary fences, and therefore will cause less material damage to private property. As a result, ranchers will spend less time fixing fence and complain less about fence damage.

The traditional game damage compensation program provided fencing material to repair existing fence, which in many instances was likely to have been repaired numerous times. Although other models of fences have been available, the barbed-wire fence has been the main type of fence used in western states since the late 1800s. Aside from tradition, ranchers are likely not to have independently explored new fencing options due to lack of time, knowledge and financial and human resources. HPP provided the mechanism and resources for ranchers and committee members to collaborate, discover migration patterns and explore alternative fencing technologies taking into account the needs of big game as well as the landowner. The conflict expanded beyond being one person's problem, to being a learning experience for those involved in HPP and other landowners, and a benefit to big game.

Population management

Population management projects include a landowner referral program and Distribution Management Hunts (DMH). The purpose of the landowner referral program is to connect hunters with landowners who will allow hunters on their property to harvest animals.

As of July 1997, two committees had ranches in the referral program: the Northwest committee had 30 ranches and Gunnison Basin committee had 5 ranches.

Committee members stated that the main objective of a DMH is to eliminate problem animals and expel big game from conflict areas. 'Problem animals' are generally lead animals that tend to return to the conflict areas on an annual basis, which is natural behavior for migrating species. The number of DMH licenses issued is limited to ten percent of the big game animals present in the conflict area. The hunts are generally held on private land where herds have congregated and are not wanted. Adjacent public land may be included in the DMH boundary if it will aid in moving elk to preferred areas. DMHs can occur between August and February, but are not held during regular rifle hunting season. In order to decrease herd size, DOW issues licenses for does and cows only.

Although the stated objective of the DMHs is not to reduce big game populations, in fact large numbers of animals are killed. As of July 1997, 14 of the 15 committees have held distribution management hunts for elk, and of the 2,939 elk licenses issued, 2,092 elk, or 71% of the maximum number, were killed (Table 5.5). The variation in number of elk targeted per area is a reflection of the historical incidence of conflicts and a function of the length of time a committee has been in operation.

Table 5.5. Number of licenses and animal harvested in elk distribution management hunts conducted as of July 1997

HPP Committee	Elk licenses issued	Elk killed	Percent killed
Middle Park	1206	820	68
North Fork	257	186	72
Sangre de Cristo	106	63	59
North Park	194	127	65
Northwest	72	46	64
Gunnison Basin	60	41	68
South Park	64	26	41
Lower Colorado River	149	96	64
Yampa/White River	13	9	69
Upper Yampa River	475	430	91
Arkansas River	63	53	84
San Juan Basin	76	16	21
San Luis Valley	166	145	87
Grand Mesa	38	34	89
Uncompaghre	0	0	0
Total	2939	2092	71

Mule deer and antelope are less frequently a problem on private property, partially because deer populations are lower throughout Colorado than specified by DOW thresholds, and the majority of Colorado's antelope tend to be in the northwest, southeast and eastern plains of Colorado, with only a few in many HPP areas. Therefore fewer DMHs were employed to distribute mule deer and antelope populations. Three committees have held distribution management hunts for antelope. Of the 518 licenses issued, 434 resulted in kills (Table 5.6). One committee reported that antelope tended to return to the area after the hunt. Two committees held DMHs for mule deer; the North Fork committee issued 57 licenses and 75% of these resulted in kills, while the San Juan Basin committee issued 17 licenses and 10 mule deer (59%) were killed.

Table 5.6. Antelope distribution management hunts conducted by HPP committees as of July 1997

HPP Committee	Antelope licenses issued	Antelope killed	Percent killed
Northwest	450	393	87
Yampa / White River	50	35	70
San Luis	18	6	33

Discussion

According to the Division of Wildlife, elk populations are higher (up to 2000 head) than specified by DOW thresholds throughout the western slope of Colorado. The Division bases population objectives on available habitat, the needs of other wildlife populations and public opinion. Hunting is the primary means by which the DOW reduces big game populations. With an abundance of hunters traversing public land during hunting season, big game often find refuge on private land, and may stay the winter. This leads to fence and forage problems for landowners, decreases chances of hunters killing animals and frustrates hunters who do not have access to private land to pursue big game. To address this issue, the landowner referral program establishes connections between hunters and landowners. However, only two HPP committees have been successful in enrolling ranches in the program. There is a combination of reasons why only a few ranches participate in the program, 1) the time required for committees to contact and connect potential parties, 2) landowner reluctance to allow hunters on their property, and 3) some ranches offer hunting

guide services for a fee, and the presence of nonpaying hunters would compete with paying customers.

Not surprisingly, committees reported that DMHs were generally successful in redistributing big game. The Upper Yampa committee reported a successful hunt in their May 1998 meeting minutes: "The hunt seems to be making an impact on the distribution of the elk ...The hunters were able to disperse the elk onto public land. This allowed hunters on public land a better opportunity for a successful hunt." In a presentation given at the 1996 Sharing Common Ground Symposium in Sparks, Nevada, a North Park DOW representative commented on the effects of his committee's distribution management hunts: "The success of the program lies in not necessarily killing large numbers of marauding elk, but in the resulting movement of the whole herd away from the problem" (Snyder, 1996).

In addition, DMHs have reduced big game numbers, which has been an ongoing challenge of the Division in many areas. The main reason stated for the overpopulation of elk has been the inadequate number of female elk killed and the changing human demography in Colorado. In their Distribution Management Plan, the Upper Yampa committee synthesizes the problem:

> The problem increasingly is the result of market forces for elk hunting and rapidly changing demographics in land ownership. Many landowners, large and small, are realizing the economic benefit of elk hunting. Few hunters are willing to pay high fees to take cow elk. Also, traditional ranches are being purchased by individuals who allow little or no hunting. Rural land is being subdivided and urbanized at alarming rates. The result of changing land use has been the over harvest of elk in some areas, mostly public land, and the under harvest of elk on private land.

While the number of hunting licenses was limited to 10% of the herd size present in the conflict area, the hunts were useful in lowering big game numbers and, in theory, in reducing habitat pressures on other big game species. According to DOW officers, in the winter, inadequate forage and habitat is not uncommon, and some animals starve. Through various means, the Division has been trying to raise the mule deer population, which has been below DOW objectives (ranging in the thousands) for over 20 years. It is thought that, through competition for habitat, the overpopulation of elk has contributed to the low number of mule deer (Gill, 1999). The hunts do not address the problem of increasing human

pressures on the landscape, but do attempt to reduce rancher conflicts and achieve a balance in big game populations.

Habitat and range improvement projects

One category of strategies funded by committees is investment in habitat and range improvement on public and private land. Committee DMPs state that such projects are designed to improve forage quality and quantity, affect the distribution of big game animals, and compensate landowners for forage loss from big game. Habitat improvement tactics include, seeding native and desirable forage species, fertilization, noxious weed control, silvicultural management, brush manipulation, prescribed burns, grazing management systems and water developments.

Between establishment of the program in 1990 and July 1997, the 15 committees had completed habitat improvement projects on 77,856 hectares of public and private land (Table 5.7). To guide committee decisions on habitat improvement projects, committees monitored the movement of 9,274 elk to determine important winter areas and migration routes. Depending on a combination of factors, including the number of conflicts in an area, funding available, territory size and interest in participation, each committee differed in the number and types of projects implemented (Table 5.8). As noted earlier, all committee budgets proposals ranked migration control, education and habitat improvement as their top priorities. Categorized data on the expenditures of the five oldest and most active committees show that the committees in fact spent the majority of their budgets on these project types, however, the proposed budget percentage did not always match the actual percentage expended (Appendix B).

The Gunnison Basin committee was the only group to implement silvicultural management, the least used method in terms of number of projects and number of hectares. Silvicultural management is a labor-intensive approach that involves cutting or thinning timber to improve habitat. HPP committees rarely used this tactic because of the labor and cost involved in relation to the amount of land affected.

Brush manipulation was the second least used method in terms of number of hectares, and the most expensive on a land unit basis due to its requirement for heavy equipment improvement (Table 5.9). Brush manipulation was also one of the least used methods of

Table 5.7. Total hectares of habitat improvement projects completed by the 15 HPP committees in Colorado as of July 1997

Project type	Private (hectares)	Public (hectares)	Total (hectares and percent total)
Seeding	6,354 (76.5%)	1,955 (23.5%)	8,309 (10.7%)
Fertilization	4,592 (57.2%)	3,436 (42.8%)	8,028 (10.3%)
Weed Control	3,311 (56.1%)	2,591 (43.9%)	5,904 (7.6%)
Brush Manipulation	389 (52.6%)	350 (47.4%)	739 (0.9%)
Prescribed Burns	1,272 (23.1%)	4,231 (76.9%)	5,503 (7.1%)
Grazing Management	12,969 (26.3%)	36,396 (73.7%)	49,365 (63.4%)
Silviculture	0	10 (100%)	10 (0.01%)
Total	28,887 (37.1%)	48,969 (62.9%)	77,856

habitat because of 1) the cost, 2) difficulty obtaining equipment and 3) public acceptance issues. As of August 1998, there were only two rotoclearing machines available for rent in Colorado, and therefore committees frequently had to coordinate schedules with other users. Also, the cost of hauling the equipment to sites and paying hourly rental was quite expensive. Committees were also concerned about the public's reaction to seeing areas of vegetation and trees bulldozed.

Of the total areas on which habitat projects were implemented, sixty-three percent was public land, the exact percentage of public land in HPP committee areas (Table 5.10); this was most likely a coincidence. The relatively high cost of prescribed burns is related to the preparation and human resources needed to oversee the projects. Timing is an important factor for a successful burn, and a few burns were canceled because conditions were not appropriate. Grazing management ranked highest in total hectares of implementation, and included over half of the total acreage of all habitat improvement projects. Overall, except for the San Juan Basin group, older committees tended to conduct more habitat improvement projects. While the size of the committee area and the amount of funding might have had an effect on the number of projects implemented, the North Fork, North Park and South Park committees rank near the top in hectares of habitat improvement projects totaled over the life span of the committee, but have some of the smallest areas and lowest budgets. In contrast, the Gunnison Basin committee has a large budget ($145,000) and committee area. Besides the age of the committee, the amount of activity likely reflects the ambition of the members and the number of people who submitted project proposals. Being in a highly populated area (Pueblo and

Table 5.8. Hectares of habitat improvement projects implemented by individual committees as of July 1997. Committees listed sequentially from oldest to most recently established.

HPP Committee (years)	Seeding	Weed control	Silviculture treatment	Grazing management	Fertilization	Brush manipulation	Prescribed burns	Total hectares per committee
Middle Park (7)	41	8	0	6,926	1,986	38	81	9,079
North Fork (7)	1,377	112	0	4,536	2,426	482	875	9,807
Sangre de Cristo (6)	695	20	0	0	162	0	0	877
North Park (6)	0	0	0	3,645	312	0	0	3,957
Northwest (6)	73	1,023	0	0	0	0	2,025	3,121
Gunnison Basin (6)	141	41	10	14,135	1,389	0	466	16,181
South Park (5)	0	0	0	19,638	0	0	851	20,488
Lower Colorado River (4)	122	5	0	0	97	0	527	751
Yampa/White River (4)	32	4,658	0	0	0	16	162	4,868
Upper Yampa River (4)	0	37	0	0	67	0	0	104
Arkansas River (3)	0	0	0	486	0	0	9	495
San Juan Basin (3)	5,488	0	0	0	1,589	203	507	7,787
San Luis Valley (2)	0	0	0	0	0	0	0	0
Grand Mesa (2)	0	0	0	0	0	0	0	0
Uncompaghre (1)	340	0	0	0	0	0	0	340
Total Hectares	8,309	5,904	10	49,365	8,028	739	5,503	77,856

Table 5.9. HPP committee expenditures on habitat improvement projects as of July 1997*

Project type	Participating committees (number)	Total (hectares)	Capital expended (dollars)	Cost per hectare (dollars)
Seeding	9	8,309	108,477	13
Fertilization	8	8,028	569,939	71
Weed Control	8	5,904	136,361	23
Brush Manipulation	4	739	85,221	115
Prescribed Burns	9	5,503	123,023	22
Grazing Management	6	49,365	69,959	1
Land Leased	3	2,466	29,600	12

*No funding was reported for silviculture management

Table 5.10. Area of public and private land for each committee

HPP Committee	Area in hectares		
	Total area	Private	Public
Arkansas River	800,048	370,290 (46%)	429,758 (54%)
Grand Mesa	382,430	99,089 (26%)	283,341 (74%)
Gunnison Basin	928,966	160,211 (17%)	768,755 (83%)
Lower Colorado River	281,902	72,986 (26%)	208,916 (74%)
Middle Park	616,283	161,257 (26%)	455,026 (74%)
North Fork	458,350	157,723 (34%)	300,627 (66%)
North Park	419,977	149,983 (36%)	269,994 (64%)
Northwest	969,153	344,892 (36%)	624,261 (64%)
San Juan Basin	1,003,460	310,827 (31%)	692,633 (69%)
San Luis Valley	1,952,380	885,314 (45%)	1,067,066 (55%)
Sangre de Cristo	1,071,913	769,634 (72%)	302,279 (28%)
South Park	440,455	135,763 (31%)	304,692 (69%)
Uncompaghre	1,293,954	409,761 (32%)	884,193 (68%)
Upper Yampa River	388,826	159,462 (41%)	229,364 (59%)
Yampa White River	980,066	385,609 (39%)	594,457 (61%)
Total	11,988,163	4,572,801 (38%)	7,415,362 (62%)

Colorado Springs), the Sangre de Cristo group placed a higher priority on educational activities, such as HRM seminars, and spent less on habitat projects.

A number of factors influence the activity level of individual committees. During interviews conducted at meetings, all of the committees reported that it initially took a couple of years to get ranchers to come forth with conflicts, a fact reflected in the low number of projects implemented by new committees. In addition, projects on public land require environmental impact statements (according to NEPA), and this factor slowed the implementation of some projects. At a meeting, a San Luis member stated: "The BLM and

FS have trouble getting NEPA stuff out because they don't have any funds, what can we do?" (Meeting, June 1998). Personalities of members can limit the implementation of projects. For example, the Yampa/White committee has the highest budget ($195,000) and ranks in the middle in terms both of age and habitat improvement projects, but during a meeting, the group alleged: "We have a pretty conservative group and sometimes we scrutinize a project too much" (July 1998).

Table 5.11. Number of water developments, salt blocks and tons of hay used by HPP committees in Colorado to manage big game and livestock distribution

HPP Committees	Private water developments (number)	Public water developments (number)	Salt blocks (number)	Hay (tons)
Middle Park	5	2	331	0
North Fork	8	14	160	29
Sangre de Cristo	0	0	175	0
North Park	5	2	70	0
Northwest	47	0	0	0
Gunnison Basin	18	18	90	202
South Park	0	3	50	1
Lower Colorado River	0	0	0	0
Yampa/White River	2	0	0	0
Upper Yampa River	0	0	0	10
Arkansas River	0	0	0	0
San Juan Basin	0	0	0	0
San Luis Valley	0	0	0	0
Grand Mesa	0	0	0	0
Uncompaghre	0	0	0	0
Total	85	39	876	242

Other habitat improvement projects involve establishing water developments and using salt and hay to attract big game. Seven committees established 124 alternative water sources on private and public land (Table 5.11). Again, the older committees had the most activity. Middle Park used the greatest number of salt blocks, while Gunnison Basin utilized the most hay. Seven of the most recently established committees did not implement water developments or utilize salt or hay. The committees that used salt blocks questioned the effectiveness of the strategy in drawing elk to preferred areas, and shared this viewpoint with the new committees. Due to a couple of winters with heavy snowfall and inadequate amounts

of forage for big game, the Gunnison Basin committee used hay to feed numerous elk in the valley to keep them from starving and from invading private land.

Report on range conditions

The evaluations of public range managers were sought. Twenty-five BLM and FS range managers who work in each of the HPP areas but are not on HPP committees, and therefore should be in a position to render neutral appraisal, were interviewed regarding the change in range conditions since 1990, when HPP was initiated. Range managers reported that the range status in their respective area varied from static to improving (Table 5.12). It should be noted however, that when range managers perceived conditions to have improved, they often attributed this to habitat projects, such as prescribed burns, education and better monitoring and grazing management programs.

For example, a BLM range manager in the North Fork area reported, "Some range is better where there were projects - about 5% increase because of public lands management and 40-50% because of grazing management and about 2% because of wildfire. So in general conditions are about 40-50% improved and the rest is static or about the same." Additional comments from range managers indicate improvements have occurred in rangeland, riparian areas and in weed management, which are specific issues upon which committees focused some of their projects. The USFS range manager in the North Fork area stated:

> The range conditions have improved a lot, especially in the valley. We have been emphasizing the use of HRM grazing and that has helped a lot. Many of the permittees are going to HRM classes, using the techniques, and rotating the grazing. They (the ranchers) are getting the word out to other ranchers and they (others) are beginning to look into HRM also. There aren't too many of the permittees grazing in the old traditional method of putting the livestock on and leaving them, there are fewer of those. And the riparian areas are looking great in many places, there is less sediment and a lot more grass, though there are some spots that aren't so good. I think overall the range conditions and riparian areas have improved, and a lot of that is from HRM practices.

Discussion

Many environmental components contribute to the immediate problems experienced by private property owners due to big game, though it is also true that many of these components are problems resulting from the general framework of present management

Table 5.12. Comments received from BLM and USFS range managers not on HPP committees, who were interviewed in December 1998 regarding change in range conditions between 1985 and 1998. Comments are direct quotations from managers. Comments and the reasons advanced by each subject are included.

HPP Committee Area (oldest to newest)	Public Land Range Condition Comments	Reasons given
Middle Park	The range is probably just as good or improving some. The district has improved.	- 5-6 years of drought that set it back - More active management - Livestock herds are being moved around more.
North Fork	Conditions are about 40-50% improved and the rest is static or about the same Range conditions and riparian areas have improved a lot	- 5% increase because of public lands management - 40-50% because of grazing management - 2% because of wildfire. - A lot is from HRM practices
Sangre de Cristo	Not a lot of change in the range conditions	- Most of the land parcels are isolated and some have been identified for disposal.
North Park	Range conditions are improving drastically and with great magnitude, real improvement the last 10 years	- We have reduced the number of grazing animals and changed all pastures to rotational or deferred grazing
Northwest	The range has improved with the exception that there is an over utilization problem with shrub component in big game wintering areas Stable to upward trend, Rangeland already in downward trends entering this time frame have continued downward.	- Result of many causative factors. - Dramatic increase in numbers of elk, while livestock numbers have remained stable, or decreased slightly. - Increase in noxious weeds
Gunnison Basin	Improved slightly, same in some areas but most of the areas are improved.	- People are more aware of conditions - We have decreased the AUMs on some of the grazing areas. - There are more management plans being implemented - More people are working with the FS and BLM and educating people on resource management.
South Park	Pretty static Range conditions have improved and are in fairly good condition	- We have had good range people managing the land.

Table 5.12 (Continued)

Lower Colorado	Improving Some range is moving from unsatisfactory to satisfactory and some is static.	- There is better management,
Yampa/White River	Pretty stable Static	- Mostly because of the weather
Upper Yampa River	Over the last 10 years there has not been much change	- With the interspecies competition there is a limit on what change can occur, the vigor of the plant groups hinges more on precipitation than on management change.
Arkansas	Improving More forage is being produced	- Number of cattle are down - There's less grazing. - There's been good weather
San Juan Basin	A static trend Range conditions have continually improved over the last 10 years, especially in the riparian areas	- We are using rotation systems and deferred rotation grazing - There are fewer weeds. - There's more management, spraying of noxious weeds and a raise in consciousness.
San Luis Valley	Range conditions are at better levels today than in the past. Static	- We are monitoring more closely
Grand Mesa	Generally improving but some areas are better than others Upward trend, some is steady	- No additional comments
Uncompaghre	The range is better now than they were 10 years ago Stable trend in range condition.	- Stocking rate has gone down - Some allotments were combined which increases the number of pastures - We decreased the time the plants are grazed by livestock. - Some areas have not had a change in stocking rate so there is a more stable trend in range condition

systems on private and public property. The traditional compensation program, in place for over 50 years, reflects the dominance and utilitarian views of attempting to control various components of the ecosystem, and being compensated or charged when damage occurs because the dominating activity was not successful. In contrast, the new model (in theory)

provides opportunities for managers to learn about the interacting components in the system, and to work within the laws of the system to reduce the amount of damage occurring, while improving the overall health of the system.

Some of the underlying factors in big game problems are due to poor riparian areas, overpopulation of big game, noxious weed invasion, overgrazing, and wildlife-unfriendly fencing. Such factors as overpopulation and overgrazing can have a dominant effect on the entire system. In the Division's traditional game damage compensation program, ranchers generally receive either (1) fencing materials to repair damaged fence, or (2) fertilizer to stimulate plant growth on private property and to compensate ranchers for forage consumed by big game.Overall, these methods tend to be site specific and do not take into account other aspects of the surrounding ecosystem nor address the underlying causes of the problems, several of which have been an issue for years. The new method offers more potential to address some of these underlying factors.

While HPP committees used fertilization on seven percent of the habitat improvement project areas, the groups employed a broad variety of additional techniques aimed at reducing ranchers' run-ins with big game species, improving the quality and quantity of available forage, considering other components of the ecosystem and addressing underlying causes of the conflicts. Besides compensating landowners for forage loss, committees reported in their five-year plans that the intent of fertilization projects is to improve forage quality and quantity in areas where big game are welcome, such as on public land where 43 percent of the fertilization projects were implemented. Fertilization is the second most expensive method on a unit land basis. Because of the magnitude of topographical variance, fertilizer is applied aerially in many areas of Colorado, adding significantly to the cost.

After gathering data from numerous rangeland fertilization studies, Heady and Child (1994) report that fertilization of rangelands undoubtedly increases forage quantity and quality, and enhances seedling establishment. Granting that responses to fertilization vary and the practice is not always profitable, Heady and Child (1994) emphasize that fertilization can provide other benefits, such as attractive forage and habitat for wildlife and rehabilitation of damaged land. Though fertilization may enhance plant growth, the practice may also encourage the growth of undesirable species, such as cheatgrass (*Bromus tectorum)* over

desired forage species, such as wheatgrass (*Agropyron* spp.) (Kay, 1966). Fertilizer was applied in habitat improvement projects on 10% of the area HPP committees managed. While many members noted positive results, others questioned the benefit and economical efficiency of fertilization. For example, a North Fork committee member commented, "We put fertilizer on a rangeland that had been burned 10-15 years earlier in one of the public forests, but... it was difficult to tell if it helped vegetative growth" (#44, Meeting, June 1998). In contrast, the person the North Park committee hired to oversee projects and do habitat analysis reported that, "Fertilization lasts more than one year, there are residual effects. ...It helps get the grass going, and keeps it doing well for years. ...In one location, the forage is much better than unfertilized areas, even after seven to eight years" (Interview, July, 1998).

As stated earlier, the majority of rangeland in the western U.S. was overgrazed during the late 19th and early 20th century. Rangeland generally refers to "all uncultivated land that will provide the necessities of life for grazing and browsing animals" (Holechek, et al., 1998, p. 1). Therefore, rangelands include deserts, forests and natural grasslands. Nearly all of the ecotypes in HPP areas consist of shrub and woodland species, coniferous forest, and alpine tundra (Vegetation map in chapter 3). Synthesizing data from several studies, Holechek et al. (1998) report that coniferous forest, mountain shrub and oak woodland types have moderate resistance to grazing, while piñon-juniper communities, sagebrush grasslands and alpine tundra areas have low resistance to grazing. Studies have shown that moderate resistance areas can recover from overgrazing in 10-30 years, however low resistance areas take 30 years, and may show no recovery after 50 years, often "requiring brush control, and often seeding, for recovery to occur" (Holechek et al., 1998, p.77). In response to overgrazing, sagebrush (*Artemisia* spp.) becomes more prominent, and cheatgrass, not a preferred forage species, replaces desirable species in the understory (Holechek et al, 1998). Likewise, piñon (*Pinus edulis*), juniper (*Juniperus* spp.) and oak brush (Quercus gambelii) stands expanded beyond their historical range of distribution in response to overgrazing and fire suppression (Johnsen, 1962; Archer, 1994). The expansion and increased density of piñon-juniper stands resulted in reduced vegetation and severe soil erosion, and with its slow recovery rate, this is one of the most depleted range types in the United States (Holechek et al, 1998). Friedel

(1991) notes that simply removing causes of disturbance does not reverse the transition, and without intervention, shrubland and woodland states could be permanent. The person the North Park committee hired to conduct habitat analysis observed 25-30 year-old fenced enclosures built on BLM and FS land and reported: "In the enclosures, where there has been no grazing, the sage brush is taking over much more than outside the enclosure where there has been a lot of grazing by livestock and wildlife. Some enclosures that are 25-30 years old have very little grass left, while there are varieties of species outside the enclosure" (Interview, July 1998). Control or partial removal of sagebrush and piñon-juniper stands can increase wildlife and livestock forage and accelerate recovery rates in a cost effective manner (Nielsen, 1977; Holecheck and Hess, 1994). Therefore, HPP's habitat projects are likely to have improved wildlife and livestock habitat.

HPP committees implemented projects to address denuded areas, especially potential grazing sites for big game. Seeding of desirable forage species is generally conducted in areas depleted of vegetation or in combination with other projects, such as brush manipulation or prescribed burns. For brush manipulation, committees utilized a variety of approaches, including roller chopping, disking and bulldozing, to clear patches for forage establishment. A new method utilized by committees is rotoclearing. This process involves a D9 bulldozer pulling a water-filled roller with six-inch blades to partially mulch vegetative debris. A broadcast seeder is mounted on the rear of the bulldozer to distribute seed. Committees have used this huge 'rototiller' to clear areas of piñon pine, juniper and sagebrush. During meetings and project tours, committees reported that seeding is necessary after a burn or brush manipulation project to ensure the growth of preferred plant species. On a project tour, a North Fork representative commented, "Horse Park was burned over 15 years ago, and nothing was planted. It was left to take its natural course, and now there's nothing but cheatgrass and knapweed (*Centaurea* spp.). When you have a fire, you need to reseed" (# 44, June 1997). During an interview, a Yampa/White River committee member recalled, "We rollerchopped an area but didn't seed it and it grew a lot of cheatgrass which is not very nutritious or wanted by elk or livestock" (1997 #88). Due to past overgrazing, present grazing and the competitive success of many non-native weeds, the seedbank frequently contains a higher proportion of weed seed than of native forage species, and land

therefore needs to be seeded. In addition, ungulates frequently do not consume many of the weeds, and as a result, the weeds are able to compete their life cycle and produce seed.

Based on my observations and on comments of committee members, seeding, brush manipulation and prescribed burns were generally considered successful in improving forage quality and quantity. Interested parties are regularly invited to accompany committees on tours of completed project sites. The North Fork committee was one of the most active in seeding and brush manipulation (Table 5.8). After visiting sites with the North Fork committee, the state HPP coordinator reported in a newsletter article:

> A number of "show me" trips have been taken to look at past projects. One set of trips has dealt with the Wake fire reseeding. The importance of that effort is evident when you look at the results. From an area heavily infested with cheatgrass, and which would have been expected to return to the same in a short period of time, to the diversity of vegetation present now is amazing. (Gerrans, 1996b)

The spread of non-indigenous plants has become a global concern as invading species alter ecosystems and burden economies (Vitousek et al., 1996). In Colorado, noxious weeds are invading forests and rangelands and rapidly displacing native plant species, thus making areas useless that otherwise could provide habitat and forage for wildlife and livestock (Westbrooks, 1998). Noxious weeds have become such a concern that in 1998 17 federal agencies formed the Federal Interagency Committee for Management of Noxious and Exotic Weeds to develop an integrated ecological program to manage noxious weeds on federal land (Mitchell, 2000). HPP committees, with other groups such as local weed boards, employed chemical, biological and grazing methods to reduce noxious weeds on over 5,900 hectares in Colorado. Committees have had success reducing noxious weeds by employing intensive rotational grazing strategies. In one instance, a rancher wanted to reseed a 422-hectare pasture and was planning on employing traditional methods of spraying the noxious weed whitetop (*Cardaria draba* (L.) Desv.), plowing, disking and seeding. After discussing the issue with the North Park committee, a joint decision was made to use livestock to reduce the white top and loosen the soil, and then to follow with broadcast seeding. The rancher did not own a sufficient number of livestock to accomplish the task, so the North Park committee arranged to use cattle from an adjacent BLM and USFS grazing allotment. Using transects

and controls, a USFS officer monitored the effects of the grazing treatment. The officer concluded in his final report that the grazing treatments seemed to:

1) reduce whitetop
2) have no observable impact on browse species or desirable herbaceous vegetation
3) provide an acceptable seed bed where grass seed were broadcast and became established. (Bradford, 1996)

Season-long continuous grazing is unrestricted grazing that takes place throughout a growing season. Utilized for decades, this common practice has contributed to soil erosion, riparian degradation and vegetation loss on public and private land. Livestock typically have preferred grazing areas, congregating in areas where forage, water and cover are convenient (Severson and Boldt, 1978). As a result, livestock can overgraze certain areas, such as riparian areas, leaving soil barren and susceptible to erosion, and underutilize forage in other sections. To address this issue, committees, in partnership with livestock growers, developed alternative grazing systems and water developments to restore riparian areas, improve forage utilization and habitat. Adapted to specific areas, the grazing systems generally employ rotational or deferred grazing methods that provide periods of rest (no grazing) during the growing season. Deferment involves a delay of grazing until key forage species reach seed maturity, whereas rotational grazing involves livestock being rotated between different pastures; livestock are grazed intensively for short time periods and then moved to a new area to graze (Holechek et al, 1998). Under rotational systems, livestock tend to utilize forage more evenly, and the rotation provides the vegetation a period of rest and regrowth.

After analyzing data from several studies involving continuous and alternative rotational grazing systems, Holechek et al, (1998, p. 229) report that alternative grazing practices are especially beneficial where:

1) Terrain is rugged.
2) Wildlife are an important consideration.
3) Water distribution is poor.
4) Poor distribution of precipitation over the range occurs within years.
5) Vegetation has low grazing resistance.

A large portion of the rangeland in the western intermountain region fits many of the aforementioned characteristics.

For years, Colorado FS and BLM managers have encouraged ranchers to change grazing periods and stocking rates to improve habitat, but according to range managers, many ranchers have been reluctant to change their grazing practices. And in some instances the parties end up in court. During an interview, a FS manager explained:

> In some areas, we have 3rd and 4th generation ranchers who are used to looking and doing things the way they have been - the area has been like this since they can remember. ...If someone (a BLM or USFS manager) wants to reduce the number of AUM's, they can be taken to court where they have to have at least 3 years of data... We can't just go out and look and figure it out because it won't hold up in court. (Manager not on an HPP committee, Interview, December 1998)

In collaboration with HPP, the BLM and the FS, ranchers implemented alternative grazing systems on 49,365 hectares, of which 74% were on public land. Sixty-three percent of the land included in habitat improvement projects involved establishing alternative grazing systems, and this proved to be the least expensive method implemented on a unit land basis (Tables 3.2-3.3). Committee members reported that the new grazing systems benefit habitat and wildlife, as well as ranchers and public agencies. The FS in the North Fork region worked with ranchers permitted to graze livestock on public land in order to update their HRM grazing schedules in coordination with the FS West Elk management plan. The district ranger reported that with the HRM system, landowners rotate their livestock more frequently, and as a result are able to increase their herd size. Moreover, elk are attracted to vegetative regrowth. The ranger said, "It's the lushest, most palatable feed. Elk are smart animals. They're going to graze what tastes best. If anything, this system is more of a benefit. We're providing higher quality feed for wildlife...we think this allotment has the potential to be one of the trend setters on the whole forest" (NFHPP, 1994).

Studies have shown that in the southwest and intermountain region of the U.S., grazing can be a useful tool to improve forage production on deteriorated rangeland, and on areas where big sagebrush (*Artemisia tridentate)* has expanded and out-competed other vegetation (Holechek et al, 1998). For example, Holechek and Stephenson (1983) found that on ranges heavily infested with big sagebrush, 20 years of complete rest had almost no influence on recovery of desirable forage species compared with a moderate grazing regime

(30 to 40% use). Moreover, Hughes (1980) determined that after 25 years of grazing exclusion, the amount of big sagebrush increased 30% to 40% while grasses decreased by a similar amount. This demonstrates that grazing by livestock, when well managed, can be a useful tool to improve degraded range areas and maintain vibrant forage and habitat for wildlife, as well as to improve riparian areas.

The degraded condition of riparian areas on grazed land has been a concern of public, federal and state public resource managers for years. Compared with uplands, riparian areas can recover to a productive state in fewer years, with proper management, and can produce five times more forage on a unit area basis (Roath and Krueger, 1982; Alford, 1993). While revegetation (planting trees and other species to replace lost vegetation) is a common practice for restoring degraded riparian areas, after reviewing over 27 riparian revegetation projects in the southwest U.S., Briggs (1995) reported that a majority of projects achieved success by addressing the causes of degradation and allowing natural regeneration, rather than through revegetation. While omitting all livestock grazing is one method to restore and maintain riparian areas, improvement is possible without complete livestock exclusion by developing alternative water sources and using delayed and rotational grazing systems (Elmore and Kauffman, 1994; Bohn and Buckhouse, 1985; Kauffman et al., 1993a,b; Holechek et al., 1982). Through a combination of alternative grazing systems, exclusion fences and water developments, HPP committees addressed some of the causes of damage to riparian areas and, as I saw on project tours and project photographs, the sites were able to regenerate naturally.

Watering sources are a main factor determining livestock and big game distribution. It has been well documented that there is heavy use of vegetation around watering areas and that forage use declines as a function of the distance from water (Holechek et al., 1998). HPP committees developed 124 water developments to improve big game and livestock distribution, and consequently, riparian areas, by attracting animals to alternative water sources, thereby minimizing livestock congregation along streams and encouraging grazing in other areas. A committee member explains a water project as follows:

> We did a water project. We put in some small ponds, small and deep is better than big and shallow because the animals stay out of it more and the water

> stays cooler. ...We use a wide-track Cat that causes less damage and tracks. It cost about $300 a pond. We spread them (ponds) out so it scatters cattle out more and it's good for wildlife too, so there's better distribution of all animals. You have to be careful around springs and pipe the water to the area for the pond so it doesn't disturb what's already there. We seed the banks of the pond and the cattle and other animals stomp the seed into the ground. (Livestock Representative #15, Meeting, June 1997)

The water development projects were considered successful in improving livestock and big game distribution, and helped reduce livestock congregation in riparian areas.

HPP groups also use hay and salt or mineral blocks to lure big game and livestock to specific areas. When salt blocks were placed so as to attract wildlife, committees reported that big game generally used the blocks but in certain cases members questioned the attractant value of the salt. At a meeting, an agency representative (#45) commented, "Salting didn't do as much as we thought for managing animals." The three committees that purchased hay stated that this method was useful in achieving the goal of attracting elk to welcome areas, and away from private property in the winter months.

In certain instances, committees lease private land to provide additional winter habitat for big game. Committees also lease land in areas where big game have shown a protracted propensity for private property or when an attempt to redistribute big game would cause conflict on adjoining private property.

With the growing human population and changing dynamics of communities in Colorado, people and organizations are taking active measures to improve and preserve local environments. HPP committees frequently collaborate with other organizations, such as local weed boards, BLM, USFS, the Rocky Mountain Elk Foundation (RMEF) and The Nature Conservancy, which have similar goals and interests in managing ecosystems for multiple community benefits. With such joint partnerships, projects generally encompass larger territories, and therefore have the potential to benefit people and wildlife on a broader scale and use money more efficiently than individual initiatives. For example, committees frequently combine efforts and funds to manage noxious weeds and, as of July 1997, eight of the committees had assisted with weed control on 5,904 hectares. Moreover, committees contributed to, or collaborated with, other local ecosystem-based initiatives such as the Owl Mountain Project in North Park, or the Axial Basin Coordinated Resource Management

Project near Craig. The Sangre de Cristo committee contributed $8,000 to the Huajatolla Private Landowner Initiative, a project introduced by six landowners who wished to donate a conservation easement of 2,430 contiguous hectares to the RMEF.

In western rangelands, change occurs slowly and varies between areas due to various environmental factors including moisture, ecotone, length of growing season and soil type. While there may be several reasons for improved range conditions, the majority of HPP's habitat improvement projects have likely increased the quality and quantity of forage, affected the distribution of big game and improved the general health of the ecosystem. While it would be nearly impossible to micromanage big game movement, HPP projects addressed several of the factors that contribute to landowner conflicts with big game. Overall, HPP projects are likely to yield longer-term benefits to the local community and the ecosystem compared to the traditional approaches.

Conflict Resolution

Measuring the success of collaborative processes requires both objective and subjective criteria. To determine whether HPP had successful outcomes, I focused on whether agreements were reached and implemented, and whether the outcomes provided satisfaction for the parties involved. The two subsections following address these questions, each followed by a discussion.

Implementing and monitoring projects

Through interviews and analysis of documents I've estimated that as of July 1997 the 15 committees had reached over a hundred project agreements, in addition to the, 503 ranchers committees assisted with fence repair. Committees did not track this information and therefore an exact number was not readily available. When questioned at HPP meetings, each committee reported that their group was able to reach an agreement and fund a project with the majority of landowners who brought relevant game related problems to them.

At meetings, each committee stated that for the most part project partners fulfilled their agreements. Six committees reported instances in which an agreement was made yet a party did not meet an obligation or had to be prodded to complete the project. A typical example consisted of a landowner or fencing crew not finishing a fencing job. In such cases,

the committee prodded the delinquent party or retrieved the materials. A San Juan member stated, "We had a problem with one person who didn't put up their white vinyl fence, so we are going to send the person a reminder or else go and pick it up" (#65, Meeting, June 1998). The Yampa/White River committee has a $250 voucher for landowners to purchase fence materials at a local store. There were two instances in which people bought gloves or boots with the voucher rather than fencing materials. The committee questioned the landowners about their purchases and corrected the matter.

Distribution management hunts (DMH) were mentioned as the most challenging projects to orchestrate. At a meeting in July 1998, Gunnison committee members reported having had problems with "people keeping their word." On two occasions, this committee had an agreement with landowners to hold a DMH. However, when the time arrived, the landowners had changed their mind and did not allow the hunt. An additional challenge of the distribution management hunts was locating a hunting coordinator acceptable to all parties and who would execute the hunt correctly. At a meeting, a San Luis committee member reported discovering that during one of the hunts, the hunting coordinator and hunters were "cutting animals off from going where we wanted the elk to go so the hunters could get another chance to shoot them" (#67, June 1998). The Middle Park committee had a problem during a hunt where, besides the scheduled number of hunters, the landowner had invited friends to hunt as well. Consequently, there were too many hunters on the property, and the number violated the DMH agreement. Three committees mentioned that they had problems when two landowners with adjacent property had contrasting opinions regarding hunting and elk on their property. The Yampa/White River committee described an instance in which one landowner allowed hunting on his property, had problems with elk eating his alfalfa and did not want elk on his land. In contrast, an adjacent landowner wanted elk on his land and did not mind elk eating his forage, but would not allow hunting on his property. During DMHs and hunting season, elk took refuge on the land of the person who does not allow hunting, thereby limiting hunters' ability to distribute elk and reduce the elk population.

Committees used a combination of methods to monitor project implementation and progress. When questioned at HPP meetings, each committee stated that, to various degrees,

they either visit project sites or rely on agency employees to visit the sites and report back to the committee. A committee member stated:

> Most of the proposed projects are looked at by agency folks or local DOW rangers. The money for the projects is not given out until the projects are done and the projects are toured. Almost every other month, we take a tour of the project areas. We brought the coordinator (state HPP coordinator) out to look at the projects and the state committee is going to tour our projects in August. (Sportsperson #77, Meeting, July 1997)

Committees tour project sites at various times of the year. The Sangre de Cristo and Arkansas River committees frequently incorporate a project tour with their regular HPP meetings. The North Park committee often partnered with another collaborative organization in their area, the Owl Mountain group, to invite community members and other interested parties, such as legislators and agency employees, on a day long tour of various projects. Committees stated that conflict sites are generally visited before projects are completely funded. However, five committees commented that they have not always taken follow-up tours of finished projects and that they plan to improve that aspect in the future.

Six HPP committees hired a local person to oversee projects, ensure implementation and report their outcomes (Table 5.2). Five committees were satisfied with the oversight employee. The Middle Park committee partnered with the North Park group to hire a person to organize project materials, monitor projects and conduct vegetation transect studies in the area. The Sangre de Cristo group hired consultants to monitor projects. The Arkansas committee hired a local retired forest manager who supervises projects and assists with project mapping and planning. An Arkansas River committee member said that this person is a great asset "because he knows the area so well. We have accelerated outputs with him, he's our on the ground eyes" (Agency Representative # 7, Meeting, June 1997). One committee, however, encountered personal difficulties. The North Park committee employed a local person to conduct a grazing study along transects. After gathering data, the person moved and the committee had a challenging time obtaining study results.

Newly established committees saw little need to hire an overseer until a sufficient number of projects warranted the action. The three committees that ranked near the top in number of habitat projects implemented (Gunnison Basin, South Park and San Juan Basin),

each reported monitoring as one of the main aspects to improve and that they had discussed hiring an overseer toward that end.

Ten committees stated that many of the project partners provided a report on the outcome of their project, and some brought before and after photographs to a meeting. As part of a written project agreement, three committees require comments or photographs of projects from project partners, and two committees mentioned that they were planning to do this in the near future. An Upper Yampa River committee member commented: "We receive verbal reports from the landowners or those involved in the project and that seems to be working. Now we require before and after photos for a project; it's written into the agreement" (Landowner #98, Meeting, August 1998).

Due to the time and distances involved, deciding how to monitor projects was frequently mentioned as a challenge. During 1997, when the Uncompahgre committee was establishing itself, they were unsure of how to proceed with overseeing project progress. An agency member said, "We've talked about developing a reporting or monitoring schedule and expecting people to provide feedback information on their project. We can't hardly go around putting in transects on all the projects" (Agency Representative #108, Meeting, July 1997).

Discussion

I noted, and committees reported, that almost all of the ranchers who came to committees with game-related fence and forage problems reached an agreement. Moreover, the majority of project agreements were implemented. There were occasions when individuals did not fulfill their agreements, however committees took ownership and demonstrated responsibility by making efforts to ensure that the money was used in the appropriate manner.

Having a written agreement was strongly emphasized as contributing to successful collaboration. Depending on the problem and project, committees did not have written agreements with all project partners. Several authors maintain that an agreement should specify names of partners, timelines and mechanisms for an agreement to be completed, including how parties will monitor the project (Carpenter and Kennedy (1988; Crowfoot and Wondolleck, 1990; Gray 1989). HPP agreements rarely contained all of this information.

This factor did not seem to inhibit their success. Depending on the project (e.g. burning or seeding), the time period allotted for the completion of an agreement varied. However, each project had a proposed date for completion. The party in charge of implementing the project was generally involved in producing the agreement, an important factor that contributes to project success (Bingham, 1986).

Based on a combination of site visits, project tours, hired overseers and feedback from project partners, committees monitored projects funded. Though this was a challenge, committees recognized the importance of monitoring projects, and frequently commented that monitoring is an activity that they would like to improve, a character that exhibits ownership and that stakeholders take responsibility for their decisions. An important statistic that should be added to each committee's project records is the number of ranchers who submit claims and proposals, and the number of projects implemented as a result.

Satisfaction of stakeholders

To measure the success of a project, committees stated that they consider whether the desired results were achieved, and if the project partners were satisfied with the outcome. When questioned at meetings, each group of committee members stated that, to various degrees, the majority of project outcomes matched their expectations, albeit the elk did not always cooperate. For example, prescribed burns and seeding provided additional forage for wildlife, improved fencing methods reduced repair and facilitated wildlife crossing, and distribution hunts scattered big game, at least temporarily, from problem areas. As stated in section three, of all the project strategies, committees questioned the effectiveness of fertilization and salt blocks the most. Through conversations with landowners and personal site visits, this author was able to see and confirm the claim stated above. Committees reported that after they toured projects and received feedback from landowners and public resource managers regarding the outcomes of the projects, the results were shared with the local community, other HPP committees and the state HPP coordinator through meetings, tours, annual reports and newsletters. If a project did not meet a committee's expectations, members sought ideas for improvement from others, including community members, agency employees and other HPP committees.

Committee members stated that many of the project outcomes were fairly predictable based on the results of similar studies, and therefore they did not see a need to establish extensive research plots for each project. An agency representative synthesized a thought common among committees:

> Early on we did a lot of studies, but we found out that what happened was pretty typical. For example, there have already been several studies that show burns help improve forage regrowth, so we don't need to keep doing it. We do take a lot of tours to the project areas. ...so a lot (of monitoring) is done by personal observation, and if the cooperator (project partner or landowner) is pleased with the turn out. (Agency Representative, #44, Project tour, June 1998)

Beside the results of a project, all committees said that they measured success by gauging whether landowners were satisfied with the agreement and its outcome. There was an overall consensus among committee members that the majority of landowners who came with relevant conflicts were pleased with the process and satisfied with the results. During meetings and project tours, I spoke with several ranchers who had HPP projects, and each of these landowners said that they were content with project results. Following are comments of representatives from different committees.

> The biggest objective is to please landowners so the complaints stop, so most projects accomplished that. (Arkansas River, Meeting, July 1997)
>
> The big thing is if the folks are happy. Complaints are down, not one in three years. (North Fork, Project tour, July 1998)
>
> Most people have been pleased. A lot of people changed 180 degrees, though you have some people who are never pleased. (Sangre de Cristo, Project tour, August 1998)
>
> The landowners have said they have been happy with the projects. (San Luis, Meeting, June 1998)
>
> We solved 95% of the problems around here because we came up with a way to solve the majority of the problems easily with the $200 limit fence form. I had an example today, a landowner called and said he had 80-100 elk on his land and some fence damage, so I went over there and sure enough he did and we talked about it and I helped him fill out the fence form for fencing

> materials for the $200 limit and he was happy. (San Juan, Interview, November, 1998)

After a committee completes its initial five years, the group submits a new Distribution Management Plan to the HPP Council and the DOW Commission. When three of the oldest committees, North Fork, North Park and Middle Park, reached the five-year mark, each group mailed evaluation surveys to agriculture landowners in their respective areas. Committees obtained names and addresses of agricultural landowners from the local treasurer's office. The questionnaires requested feedback on committee activity and asked landowners for their perceptions on whether HPP was making a difference in game damage conflicts. The three questionnaires were similar in context and are reproduced, together with a summary of responses, in Appendix B. Based on these surveys, between 63% and 85% of the respondents were familiar with HPP. The majority of those who responded (58-93%) thought HPP helped "reduce fence and forage damage/conflicts with wildlife," while 16-37% did not know and 5-10% said HPP did not help. Distribution hunts, stackyards, new fence designs, HRM seminars and grazing management systems were mentioned most frequently as being "worthwhile" HPP projects, whereas fertilization and dispersal hunts were listed as not being "worthwhile." Of the two surveys that asked landowners if they were currently having problems with elk, 61% and 81% of the respondents said yes, and attributed the problems to there being too many elk, to human activities and to conditions during a specific winter season. Close to 25% of the respondents thought that they had more problems with elk. Fifty-four to 57 percent of those who responded thought that they were adequately represented by the committee, 5-10% indicated that they were not. The three committees who conducted the surveys reported the results in their respective five-year distribution management plan. Four other committees who were approaching the end of the five-year period reported to me that they were planning to mail a similar survey to landowners in their area.

During committee interviews and project tours, several members stated that many landowners said that they were glad to have a place to share their problems. At a meeting, a landowner commented that HPP is a better process than the traditional game compensation method and has improved relationships, "It's improved, 120%, no doubt. It's given all of the

landowners an avenue that when we do have questions or problems, we have a place to go" (Not a committee member, Meeting, August 1998). Moreover, committee representatives said that HPP members and landowners were pleased about being able to make decisions, and establish projects and solutions. At a meeting, a Gunnison Basin member said that people were glad to be "doing their own projects and not being run by outsiders." And a Yampa/White River member contributed that a benefit of HPP is "the ability to have local control - to decide on something, fund it and see it get done" (#91, Meeting, June 1998).

HPP members thought that besides aiding landowners with big game conflicts, the HPP process contributes to more honesty and less complaining from landowners regarding big game issues. One member recalled:

> Before HPP there was a lot of whining about elk, but now the landowners on the committee force a lot of honesty when other landowners come to the meeting and sit with their neighbors who tell about all the elk they have. And sometimes the member landowners will say, 'now there's not really that many elk up there.' So a lot of those that used to complain and whine don't anymore. (Landowner #49, Meeting, June 1998)

A landowner on a different committee said:

> I believe it's (HPP) cut down on the amount of people protesting different things about wildlife. Prior to HPP there were tremendous numbers of people complaining about the Division not doing this or that, but after HPP started a lot of these issues went away. I guess they are not as great of an issue when they are sitting across the table talking with their peers. So there's not nearly the problems that we had before HPP. (#70, Meeting, June 1998)

Discussion

Committees measured their success by whether a project had the desired outcome and whether landowners were satisfied. It is not surprising that landowners would appreciate having a local committee available to share problems, and discuss and implement creative solutions, as compared to submitting several detailed forms and waiting for a decision from outsiders. Moreover, it is evident that, at least in certain cases, committee members make landowners accountable for their claims, which can build trust among parties. While the majority of landowners were reported to be pleased with the process and project outcomes, attempting to manage components in an evolving ecosystem will likely be an ongoing

challenge. Several uncontrollable external factors affect the efficacy of any method to resolve environmental conflicts. The problems involved in HPP cases are caused by migrating species that cannot easily be controlled. A committee member synthesized this point:

> Most of them (landowners) seemed to be happy with the results, but at the same time there's no amount of burns or salt that are going to hold elk anywhere during the hunting season. Their first desire is a place to hide and second is water and food, so all the projects aren't actually going to resolve the conflicts. (Sportsperson #68, Meeting, July 1998)

Not only were the landowners and committee members pleased with HPP, agency employees spoke positively of the program. At a time when public land managers are challenged with the responsibility of applying more ecosystem-based management and responding to "multiple use" policy, many agencies are confronted with budget cuts. Apparently, agencies have historically pursued their objectives unilaterally and have had relatively little involvement in the activities of other agencies. The partnerships and funding provided through HPP allowed agencies and organizations that have similar goals and interests to advance their agendas and accomplish activities they may not have been able to pursue independently, such as public educational projects on natural resource management and habitat projects that allowed them to advance their goals of ecosystem management. There were many comments reflecting this fact among committee members.

> HPP helps the DOW too. Now we have the money to do some elk trapping, habitat projects and other projects that we wanted to do before but didn't have the money. (Agency Representative #42, Project tour, July 1998)

> The BLM wouldn't have done hardly any burns because we haven't had the money, but we've done six since we started with HPP. (Agency Representative #44, Project tour, July 1998)

Some committees received letters indicating the same. In a March 1998 letter to the Lower Colorado HPP committee, a BLM Area Manager stated,

> We have completed our work for 1997, and we treated more acreage than ever before. Weed management nationally, is getting more attention each year, and we expect our budget to continue to increase. One of the reasons our budget

> has increased is due to our partnerships. ...The HPP committee has been an important partner for the last three years and I want to thank you for that.

Overall, HPP committees have been successful in reaching agreements with landowners and in implementing projects aimed at resolving and minimizing conflicts caused by big game. Although the big game did not always cooperate, HPP projects generally improved habitat, addressed some of the underlying causes of the conflicts and satisfied landowners who had problems. Moreover, the process of sharing problems, discussing solutions and establishing partnerships and projects build relationships among members of the community.

Notwithstanding the establishment of HPP in 1990, the DOW's traditional game damage compensation program continued to operate in the conventional manner. To compare the two programs, I collected statistics from the DOW's traditional program on the number of claims, the species connected to the claims, and the amounts paid for claims between 1970 and 1997. Generally, the aforementioned information was available for the state and for defined regions within Colorado. However, regional data were missing for various years. In addition, regional boundaries increased three times between 1985 and 1995, from four regions to eighteen, and no regions correspond directly to HPP areas. Since accurate comparisons between regions cannot be made, statewide data for the traditional program are being presented. HPP committees did not record the number of claims filed nor the number of projects implemented. Therefore, a comparison of the number of compensation claims submitted or paid by HPP and the traditional program could not be presented.

The Division of Wildlife spends a significant amount of money each year on property damage from big game (Table 5.13). HPP covers a smaller area and spends more money than the traditional program. While the majority of funds spent in the traditional program compensate for fence damage or forage loss, HPP funds are investments in many components of the system; local economies, communities and environments. Through HPP, committees have established partnerships and invested in educational and habitat improvement projects aimed at addressing some of the underlying causes of the conflicts caused by big game, which over time can enhance communities, both socially and environmentally. In addition,

Table 5.13. Statewide DOW expenditures for damage claims in the traditional game damage compensation program and in HPP. Committee expenditures include fence and habitat improvement projects. The number of HPP committees operating changed annually. Source: Division of Wildlife, 1999; HPP annual reports.

Fiscal Year	Traditional DOW Program* (Statewide)	All HPP Committees (all areas)	Number of HPP committees each year
	Amount expended ($)		
1990-1991	98,181	84,929	2
1991-1992	258,466	93,783	6
1992-1993	276,157	167,121	7
1993-1994	120,444	217,931	10
1994-1995	172,246	344,122	12
1995-1996	141,359	477,934	14
1996-1997	210,340	589,714	15

*For fence and forage claims as a result of elk, deer or antelope activity.

based on responses from committee members and landowners, there is a higher degree of satisfaction expressed for HPP than for the traditional program.

Data collected from the Division of Wildlife on the number of statewide big game fence and forage damage claims paid between 1970 and 1997 are shown in Figure 4.1. HPP operates in only part of the state, but committees were initiated in the most habitual conflict areas. There seems to be no obvious relationship between the existence of HPP and the number of claims via the traditional system.

There are a number of factors that affect the number of claims submitted. DOW officers stated that the number of claims tend to fluctuate annually as a function of habitat conditions, human pressure and weather conditions, as indicated by the reported 'tough' winters of 1983 and 1992. The fact that HPP started with two committees and annually added 1-2 committees may be a factor because each committee took time to organize and publicize the program in their area. In addition, the state's expanding human population likely has an effect; between 1980-1990, Colorado's population grew by 34,674 (8% change) in the 30 counties where HPP is active, however between 1990 and 1997, the number of people increased by 114,816, a 29% change. In 1997, a year before the claim data were compiled in a report, the HPP statewide coordinator stated that these records would most likely not be a good indicator of the effects of HPP because before HPP started, "most landowners wouldn't

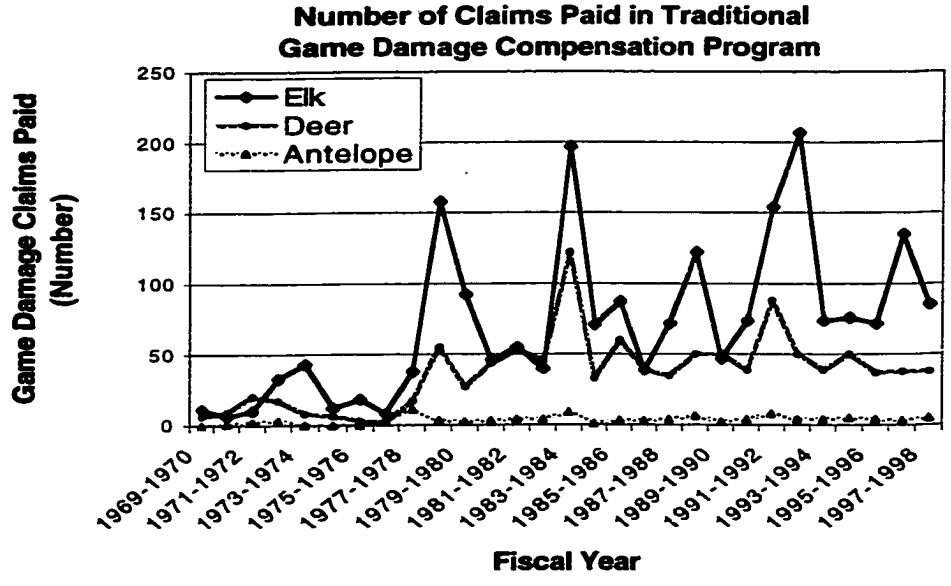

Figure 4.1. Number of game damage claims paid statewide in the traditional game damage compensation program between 1970 and 1998. Source: Division of Wildlife, 1999.

even talk to the DOW" (personal conversation, July 1997). He maintained that the lack of communication between the two entities was mainly because many landowners had been frustrated and upset with the DOW from past experience involving big game damage compensation and big game populations. Several landowners, Division employees and sportspersons confirmed this comment. A landowner stated in an interview:

> Before HPP, they (landowners) were getting pretty frustrated with trying to get any game damage [payments] through the Division, because to do that, the rancher had to show historical use of wildlife. And there was lots of paperwork to do before they would even come and look at it... It was like pulling teeth to get money from the DOW, so a lot of ranchers were pretty upset. We pay a lot to rent and grow feed and then we pay to feed the elk and the cattle. ...makes it harder to survive. (#1, Interview, July 1997)

A DOW employee supported the landowner's statement:

> ...with big game damage reports – it was very complicated with lots of paperwork. Many ranchers and DOW people dreaded doing it, and often many ranchers dropped their claim after they saw all the paperwork and stuff they needed to do. (#42, Project tour, June 1997)

Frustration and concerns over wildlife management and property damage escalated between the DOW, agriculturists and sportspersons during the 1980s, and were the reason HPP was initiated. Paperwork was not the only cause of tension between the DOW and ranchers. A DOW manager stated that the process could easily cause conflict when a DOW officer and a rancher disagreed on the number of big game on the property, "For example, some rancher comes in here and says he has 400 elk on his property when there was only 50 or something... so we basically end up calling each other liars" (#107, Interview, July 1998). A different DOW officer indicated that another factor in ranchers' contention with the DOW was that some landowners "have a set view of elk ...they just don't want any elk on their property" at any time, and others who only want elk "on their land during hunting season" (#26, Interview, November 1998).

Collaborative methods are frequently characterized as providing win-win outcomes and HPP confirms this statement. In today's changing environment, society is becoming more complex and interdependent, and people are recognizing benefits of working together to reach outcomes that would be difficult to achieve independently. The success of the program in resolving and reducing disputes and differences can be attributed to many factors. As noted above, the old method caused frustration between landowners and the DOW, and left other stakeholders out of the process. HPP committees made efforts to include stakeholders and work across boundaries. A sportsperson stated:

> Initially I didn't realize how large of a role we play. Our committee is made up of managers who can make decisions and commitments and carry them through. When you have managers it makes a big difference. And we're able to look at areas more on a landscape basis than individual parcels...the elk don't care whether its public ground or private ground. I'm a big supporter of HPP and I think communication has improved with the DOW, the Forest Service, the BLM and the ranching community. Part of the reason may be because ...I recognize private property rights and know how people feel, but when we can all cooperate together, it works a lot better, ...and when agencies are able to look across their borders. (Sportsperson #102, Interview, November 1998)

The historical game damage compensation process and HPP differ in the type and degree of involvement of the interested parties in decision-making. The older method was

adversarial as it positioned one person's opinion against another's. Moreover, the final decision was imposed top-down from the Division. Through HPP, the process is cooperative and inclusive of the immediate stakeholders. The fact that a landowner would attempt to participate in the program exhibits an increased amount of trust in the system and the DOW.

While both methods aim at resolving site-specific problems, HPP takes a more holistic approach. Committee members and partners discuss the issues, incorporate relevant information from the area, and attempt to choose projects to alleviate the present problem. Furthermore, HPP projects are designed to reduce future incidents and provide several benefits to the community. While there is evidence that people have worked together to address some of the issues causing conflicts and have had positive results, have relationships between the stakeholders changed?

Communication and Understanding Between Stakeholders

Improved human interaction is also a measure of success of collaborative ventures. To determine if communication and understanding among stakeholders changed through the HPP process, I elicited committee members' perceptions on this, including the degree to which they perceived that interaction between committee members outside of HPP activity was affected. The following sections address these questions.

Strengthened relationships and communication between local stakeholders

There was near universal agreement among committee members that one of the key outcomes and successes of HPP was improved communication and understanding between landowners, agencies and sportspersons in the community. By means of the telephone interviews I conducted with 103 committee members throughout November and December 1998 I determined that 94% of them thought that HPP had improved communication between landowners, sportspersons and agency representatives.

At meetings and during interviews, members claimed that there was little constructive communication between the stakeholder groups before HPP. In contrast, interview respondents stated that HPP allows parties to convene to discuss and learn from one another in a constructive manner and work together to achieve common goals. A landowner commented, "The communication is much more constructive with HPP because it brings

people together. Before HPP it was difficult to do. Now there's a more neutral environment" (#52, Meeting, July 1998). Members commented that there was some communication before HPP, specifically between agencies and sportspersons, and between agencies and landowners who had grazing permits. Committee representatives stated, however, that communication had risen to new levels since the program started. Members from different committees commented:

> There was some [communication], especially between landowners that have leases for livestock on public land - but nothing like there is with HPP, with everyone sitting down and listening to each other's problems and ideas. (Landowner #18, Interview, December 1998)

> There was some communication between landowners and sportspersons with the agencies, especially those with public land grazing permits. But now the subjects are changed, now we are working together to accomplish goals - and we're talking with landowners in a way that we never have before. (Sportsperson #102, Interview, August 1998)

> Absolutely, definitely, there's no doubt in my mind, it's facilitated communication and improved relationships. The whole process has been very helpful and has opened channels of communication that weren't there before. (Agency Representative #22, Interview, November 1998)

> Oh yes. It's opened up doors of interaction between the DOW and landowners and agencies and sportsmen that weren't there before. I'm probably one of the biggest drum-beaters for HPP. I think it's the best thing that we have done. (Agency Representative #50, Interview, November 1998)

Of the 103 committee members interviewed, three individuals said that they thought communication between the stakeholder groups was "about the same." Two members stated that they did not know, and an agency member from a more recently established committee stated:

> In general, it's improved communication with committee members, but I don't know about the others. HPP is a good vehicle for increased communication, but it doesn't mean it always occurs...but there's a vehicle they can come to. (Agency Representative #66, Interview, December 1998)

Communication with sportspersons

Points of contention between sportspersons and ranchers involve divergent opinions on the desired number of elk and the level of hunting access on ranches. Comments received indicate that landowners and sportspersons, at least in the HPP areas, are communicating better and establishing relationships. A sportsman emphasized change in landowner perspectives; "It's improved ranchers attitudes toward the DOW and big game, that's the big thing" (#95, Interview, November 1998). When asked if he interacts with other members outside of the regular HPP meetings, a sportsperson commented,

> Yes I do, especially with the ranchers and many of the sportsmen...we see each other quite a lot. Just the other day I ran into one of the ranchers and we talked about an hour and a half over a cup of coffee about different things... We meet up and talk over lots of issues... It's improved communication, it really has with the ranchers and that. A lot of hunting was just done with the buddy system. You had to know someone to hunt on their ground. Now a lot of ranchers are agreeing with me, that we need to get hunters on the land to move elk. (Sportsperson #40, Interview, December 1998)

Communication and interaction among agencies

Traditionally each public agency worked relatively independently to manage public resources. During meetings and interviews, agency representatives indicated that before HPP there was not much communication or collaboration between the agencies, and that there was some tension between the DOW and the land management agencies. A Division representative commented, "Before HPP there was a lot of conflict of interest between agencies...for example, before, the BLM only worked on BLM projects, and only looked at range, they didn't consider wildlife and other issues much" (#53, Interview, July 1997). While the USFS and BLM are charged with trying to manage for 'multiple use' interests, the Division is challenged with managing wildlife in areas over which the DOW has little authority. A Division officer stated:

> The Division is supposed to manage all the state's wildlife, on both public and private land, but we have little control over any land. Landowners want wildlife but often not on their land...the BLM and Forest Service manage more for public use and timber production and don't manage much for wildlife habitat...they are doing more recently. (#66, Interview, August 1997)

Members stated that participating in HPP has led to greater interaction and understanding between the public resource managers. A sportsman commented, "It's my understanding that the DOW, BLM and FS didn't know each other existed before HPP existed, so I think their communication has increased dramatically" (#77, Interview, December 1998). Agency representatives offer further support for this view:

> Before HPP, there wasn't much communication, everyone just did their own thing and called each other names. All of the agencies worked separately and seldom worked together. Now we just call each other names at the meeting but have a good understanding of each other... like I always give Fred (the Forest Service rep) a hard time about cutting down all the forest to 'improve habitat'. ...Now is the first time all three agencies are working together. (Agency Representative #80, Interview, August, 1997)

> Actually it happens on a pretty regular basis, we seem to contact each other a lot, especially the agency folks...and the landowners often stop in to ask questions or have referred other ranchers to me about ideas or to get on the agenda for the HPP meeting. (Agency Representative #31, Interview, November, 1998)

Bridging relations between the Division and landowners

The prevailing poor relationship and communication between landowners and DOW officers was one of the main reasons DOW and agriculture leaders created HPP. No one countered this claim. A landowner stated, "Before HPP, a lot of the communication between the DOW and ranchers was negative" (#32, Interview, August 1997). After joining an HPP committee, a sportsman recalled, "I couldn't believe how much animosity there was from the ranchers towards the DOW" (#77, Interview, November 1998). Tension had built over procedures and different points of view, and resulted in less communication.

Committee members stated that communication and understanding improved between the Division and ranchers since HPP started. A DOW representative commented, "HPP has improved the Division image with the landowners, ...some thought the Division doesn't care but now know they do care and are more acceptable of the Division" (#42, Interview, December 1998). Landowners from different committees commented:

> I think it's [HPP] done a lot to help with the general feeling between the DOW and landowners. There's been an age-old rivalry and I think HPP has helped quite a bit. Now we're talking and understanding each other better, and know that the DOW isn't the enemy. (Landowner #23, Interview, December, 1998)

> Communication's improved a bunch, especially between the ranchers that I represent. HPP has really helped a lot... A lot of people that did complain came in and they saw that we were doing something. I think it has helped a lot with communication. And the other way too, the landowners see and understand more of the wildlife point of view. (Landowner #1, Interview, December, 1998)

During a telephone interview, a Division officer said that he did not know whether communication had changed because he spent most of his working days in the office and, as a result, had little interaction with people. The following day, the same officer called me and reported the words of a DOW colleague who works in the field, "He thinks it [HPP] is helping and that people are getting along better and communicating with each other more. He said he used to just drive around looking for elk and that, but now landowners stop him and take him out and show him where the elk are. ...[He] said he is talking with the landowners more and they are talking to us" (#26, Interview, November 1998). All of the Division representatives on HPP committees spoke positively of HPP. One officer stated,

> It's improved communication and understanding, absolutely, especially between the DOW and landowners. And I think it's helped communication with other agencies, think they feel like they have a say in our business on their land. And I think it has given the DOW a local sounding board on DOW ideas on other issues. It's one of the best things we've ever done. There've been a lot of changes. (#6, Interview, December, 1998)

Comments received from the general public

Committee members reported receiving several positive comments about HPP from outside sources such as legislators, landowners and sportspersons. The HPP coordinator received encouraging feedback when he attended the legislative hearings to reauthorize the HPP program. In a newsletter, he informed committee members, "At all the meetings I attended, HPP was mentioned as a positive approach to dealing with conflicts" (Gerrans, 1995). The coordinator received a similar message when he attended the State Cattlemen's

Association meeting: "Senator Dave Wattenberg commented on how positive all the responses were toward the HPP program" (Gerrans, 1995).

Committee members reported receiving positive comments from the local populace, which indicates that the publicity and projects HPP committees are generating are making a positive impression in local communities. A committee member commented:

> I think it's the best public relations that has gone on in the valley. It's quite a thing, even other individuals have told me so, other sportsmen, landowners and just everyday people said they liked what was going on. It makes us feel like we're putting in time that matters. (#38 Landowner, Interview, November 1998)

Interaction outside of HPP

To discover whether there was much interaction between committee members outside of HPP meetings, each committee member was asked the following questions:

1) In the last year or so, have you met with other committee members outside of the regular meetings?
2) Do you ever call or contact other committee members if you have a new idea or a question about something?
3) Have any of the committee members referred someone to you?

The scores indicate that a majority of the committee members interact outside of HPP functions. The older committees, as well as the two most recently established committees, tended to have more communication between committee members outside of the regular HPP meetings (Table 5.14). Besides planned activity, such as helping each other or touring areas together, the most frequently mentioned places of interaction were school functions and the meetings of other organizations. Distance between members and the size of the HPP area were most frequently mentioned as a reason there was not more interaction between members. In a December 1998 interview, a Yampa White representative (#90) stated, "Our area is so big so we don't see each other a lot." A San Luis member offered a further explanation, "We're from such a large area and we're all spread out, our HPP area covers 8,000 square miles. Most of all our ideas and project stuff is handled at the meetings unless there's something urgent. We try to get the information out before the meeting so we can all look through it" (#68, Interview, November, 1998). While size of territory may limit

Table 5.14. Responses to 1998 interviews regarding communication and interaction between committee members outside of regular HPP meetings. Committees listed in the order of establishment, from the oldest to most recently established. Responses calculated on a 0-2 scale with 0=no, 1=some, and 2=yes

HPP Committee	Date HPP committee approved	Committee Area (hectares)	Met with committee members outside of HPP meeting?	Call other members with new idea or question?	Have other members referred someone to you?	Response average
Middle Park	Feb-1990	616,283	1.75	1.38	0.63	1.25
North Fork	Feb-1990	458,350	2.00	1.71	1.43	1.71
Sangre de Cristo	May-1991	1,071,913	1.67	1.33	0.67	1.22
North Park	Jul-1991	616,283	1.57	1.29	1.14	1.33
Northwest	Jul-1991	969,153	1.29	1.00	0.71	1.00
Gunnison Basin	Dec. 1991	928,966	1.86	1.00	0.71	1.19
South Park	Sept-1992	440,455	1.57	0.86	0.43	0.95
Lower Colorado	Jan-1993	281,902	1.14	0.86	0.43	0.81
Yampa/White	Jan-1993	980,066	1.29	0.86	0.57	0.91
Upper Yampa	May-1993	388,826	1.14	0.43	0.29	0.62
Arkansas River	Mar-1994	800,048	1.43	1.00	0.57	1.00
San Juan	Mar-1994	1,003,460	1.43	1.00	0.14	0.86
San Luis	May-1995	1,952,380	1.29	0.86	0.29	0.81
Grand Mesa	Jul-1995	382,430	1.83	1.33	1.33	1.50
Uncompahgre	Jul-1996	1,293,954	1.71	1.43	0.86	1.33

interaction between some group members, the committees with the smallest areas, Lower Colorado and Upper Yampa, ranked low in all three categories. Personality differences and level of community involvement are likely to account for differences among committees. For example, a Lower Colorado representative reported, "...people are so busy trying to earn a living and have some time for recreational activities, there's not a lot of time for civic activities" (#26, Interview, December 1998), while an Upper Yampa member commented, "I'm kind of out of the loop as far as community affairs are concerned" (#97, Interview, November 1998). In some cases, there seems to be both a lack of conflict among members as well as a lack of interest in interacting outside of official functions. For example, the Upper Yampa group received a three percent response to their initial survey (Table 5.1), held the fewest meetings (Table 5.2), and implemented habitat improvement projects in a small

area (104 ha.). On the other hand, according to DOW records on fence and forage compensation claims in the traditional program, Routt County (most of which is included in the Upper Yampa area) was consistently one of the top three counties in which claims were most prevalent between 1980 and 1986 (county data were not available for subsequent years). The Upper Yampa issued the second greatest number of DMH licenses, which resulted in the second highest DMH elk kill.

Having a large number of meetings and social activities during the initial startup phase (North Fork and Gunnison Basin), and having monthly meals together, (Sangre de Cristo, Arkansas River and San Luis Valley) probably favored greater overall interaction and communication among committee members.

The North Fork committee differed in that each of the seven members stated that besides meeting randomly in town, they help each other and have planned joint activities or field trips. An example mentioned by each of the representatives was an attempt to move a herd of deer.

> Heavens yes, all the time, in fact last Friday we were all together, we moved some elk to the wildlife refuge area, at the request of a landowner. One of the landowners on the committee organized it all. Most of the committee members were there, and there were some sportsmen, other landowners and some town people, and other people too. It worked out pretty well. ...Anyway, we have a lot of interaction between meetings...We seem to interact all the time. (North Fork #42, Interview, November, 1998)

Fewer committee representatives contacted other committee members with ideas or questions. Again, the oldest and newest committees tended to rank the highest, and the amount of contact tapered for committees of median age. The Upper Yampa committee ranked at the bottom in the category of contacting each other with new ideas or questions. In interviews, four of the seven members mentioned that the committee's secretary handled many of the details and kept members abreast of meetings, information and proposals, and therefore they did not tend contact each other very often between meetings. A committee representative explained,

> No I don't (contact others). I think our committee interacts well at the time of the meeting and talks a lot. We're fortunate we have [a secretary]. She puts together all the information and gets it out to us before the meeting so we can think about it, think about what should be changed or whatever, so before the meeting we have our ducks in a row, and at the meeting there's some compromise if need be. So there's not lot of interaction between meetings about projects. (Landowner #96, Interview, December, 1998)

Members of other committees with low incidence of inter-meeting contact stated that for the most part the groups were able to complete their discussions and activities at the meetings. During the 1998 interviews, a Yampa White representative (#91) stated, "If we have new ideas or questions, we bring them up at the meeting", and a San Luis member (# 73) said, "We usually get most things done at the meetings." When asked if members contact each other much between meetings, a South Park member (#82) remarked, "If anything comes up we do. But this is a little enough community that we see each other quite a bit anyway. We don't always talk about HPP but we see each other around and may talk about other things going on." When asked the same question, a San Juan representative reported:

> That's basically the interaction that we have. Someone may call, and say, 'I was thinking maybe this might work on this piece of ground, what do you think?' Or I've called to say 'So and so called me, and they want to do this and their property borders the BLM or the Tribal area.' So I call that rep and ask what they think. (Sportsperson #62, Interview, November 1998)

Overall, members stated that they seldom referred a person to another committee member, but spoke with the person directly. If the issue required additional information, from an agency for example, then the committee representative referred a person to the committee member representing the respective agency or invited the person to the next meeting. Rather than receiving referrals from each other, representatives reported that the majority of referrals were from other landowners and community members. In an interview, a sportsman commented, "We get a lot of referrals from other landowners, as much as anything, like we've done work with a neighbor and they tell their neighbor, or someone is at another public meeting and someone mentions to them that they should go to an HPP meeting. (#62, November 1998). A landowner stated, "Yeah, actually I get quite a few people that way. ...I think all the committee members get people referred to them about HPP" (#83 November

1998). In addition, members stated that landowners with wildlife problems frequently contact the person that represents them or who they know on the committee. A landowner commented, "A lot of ranchers from this watershed call me about HPP because they know I'm the only rep in this area, the others on the other side probably call [another committee member]" (#94, Interview, December 1998).

Members of committees ranking highest in this category (North Fork, Grand Mesa, North Park) indicated that they frequently communicated with fellow committee members.

> I know I sure talk to them more than if HPP was not in place, though I talk to some more than others. Like I call [another committee member] when I might have a problem with some roads... I can easily call him up, or others on the committee, whereas before I wouldn't have called. We talk to each other about lots of things other than HPP, but we also talk about HPP things. We call each other about problems or ideas, and can refer each other to others in our offices to answer the questions. (North Fork #44, Interview, November, 1998)

> My phone calls have increased quite a bit. I talk with them a lot, sometimes people call to say different things like, "I see a herd of elk over here. Quite often they're more friendship type calls, now they have a better excuse to call the warden and just visit. That's something I've seen, is people calling just to talk where they wouldn't have before. (Grand Mesa #11, Interview, December, 1998)

> I'd say almost on a daily basis. I talk with all the agency people and the landowners too, weekly if not on a daily basis. We discuss how we can cooperate and communicate better. I think we are probably one of the better examples of HPP, our group. I feel comfortable that I can call anyone on the committee to ask for something and get it. We call each other with ideas or projects or about how to do things better...So yeah there's quite a bit of interaction between us outside of HPP. HPP meetings are one of the few meetings that I have that I actually look forward to. (North Park #46, Interview, December, 1998)

The overall high interaction within Middle Park, North Fork and North Park members is related to the relatively small size of their management areas, specific individual personalities and the length of time they have been working together as a committee. The particularly high interaction rating of the North Fork committee can be partially attributed to the number of meetings and team building activities during their initial startup phase

(described in Section 1, p. 6). This group tended to excel in trying new fencing technologies and habitat improvement projects, and sponsored several innovative educational activities in the community, such as collaborative projects with the local schools and meetings for hunters and nonhunters to discuss issues.

Table 5.15. Interview responses regarding communication and interaction between committee members outside of regular HPP meetings. Categorized and averaged by stakeholder groups. Responses calculated on a 0-2 scale with 0=no, 1=some or little, and 2=yes

Interest Group	Met with committee members outside of HPP meeting?	Contact other members with new idea or question?	Have other members referred someone to you?
		Response Average	
Landowners	1.32	0.93	0.20
Sportspersons	1.40	0.93	0.47
BLM	1.79	1.43	1.50
DOW	1.80	1.27	1.07
USFS	1.85	1.31	1.23
Agency average	1.81	1.33	1.27

The relatively high ranking of the two newest committees is partially due to the calls and interaction necessary to establish their committee, and the personalities and activities of the members. The Uncompahgre committee covers a large area. However, the majority of committee members live and work in relative close proximity (about 32 km.). In some areas of Colorado, federal natural resource agencies such as the FS and BLM share the same building. Such is the case in the Uncompahgre area, facilitating committee member interaction. For example, an Uncompahgre landowner commented:

> I talk with [FS agent] and [BLM agent] once in a while because they are our public land managers for our permit where we run the cows - when I stop in the office for something else I usually stop in and see them when I'm there. (#105, Interview, December 1998)

Not surprisingly, agency representatives consistently had more interaction and referrals than either the landowners or sportspersons (Table 5.15). Agency members said that since HPP started, they tended to communicate more frequently through collaborative

projects or by calling each other for information. Scores for landowners and sportspersons were relatively similar for all three questions. The most notable difference between the three categories (sportspersons, landowners and agency representatives) was the number of referrals received from other committee members. The three agencies ranked above one, whereas the aggregate scores for sportspersons and landowners averaged below one. Ranchers and sportspersons tend to receive referrals from other landowners or community members. Representatives mentioned that landowners who graze livestock on public land, who have land that borders the BLM or USFS, or who want information from a particular agency tend to get referred to the respective agency representative on the committee, rather than to a landowner or sportsperson. A BLM representative explained,

> Yeah I've gotten a few people referred to me, the latest was a landowner who came to me from one of the other landowners. He was mostly unaware of HPP, but he had a problem on his property and his property bordered the BLM, so he came to me. Through the course of the conversation I got him to come to an HPP meeting, and now we're working on a project with him. (Agency Representative #10, Interview, January 1999)

Interaction and exchange of information between different committees was reported on several occasions. It was common for neighboring committees to tour one another's projects and to collaborate to fund and implement projects.

> We took a tour of a Sangre de Cristo HPP project. It was a roller chop and burn project, so we talked with them to see what they did and how they did it, and talked with the landowners about what they thought. We had 5 people from our committee there. And there were over 30 people there from DOW, FS, BLM, and landowners and all sorts. I think there's a lot of interaction between committees too. We're in the process of putting together some workshops on conservation easements with the Sangre group. (Sportsperson #5, Interview, January 1999)

Discussion

To serve its purpose, EDR requires collaboration and discussion; the process relies on parties collaboratively establishing common goals, defining problems, finding information, designing the process, exploring options and reaching and implementing an agreement. Each of which demands communication. As was documented in the preceding sections, all

committees have progressed through the various stages of EDR, from establishing goals to implementing projects. Therefore, it is no surprise that an outcome of HPP would be increased communication between participants, especially compared to the time period before HPP when, apparently, there was little interaction between stakeholder groups.

Prior to HPP, agency officers, ranchers and sportspersons generally worked independently to pursue their goals and interests and, consequently, had little reason for interaction or communication. Moreover, the traditional game damage compensation process involved little communication between DOW representatives and landowners. In contrast, HPP provides a forum for stakeholders involved in livestock and big game issues to gather, discuss and share concerns, and to jointly pursue options to resolve and reduce local problems. Besides communication, each as documented in the preceding sections, committee members have been doing this voluntarily on a monthly basis for up to nine years (Appendix B).

In many EDR cases, parties interact over a relatively short period of time to resolve site-specific conflicts. In contrast, since 1990 HPP committees have addressed numerous problems involving hundreds of people and encompassing millions of hectares. Through HPP activity, committees build networks and communication not only between the participants, but also within communities and between communities.

Almost every committee activity involves HPP members networking, collaborating, sharing information and communicating among themselves as well as with community members. At the outset, through surveys, public meetings and research studies, committees gathered technical and local information on land, wildlife and habitat issues from locals, and shared it with the greater community. Meetings, workshops, project tours and educational activities sponsored by HPP brought together a diversity of people from several communities, from state legislators to local business owners, to discuss issues and share information. Committees have shared the knowledge they have gained through personal conversations, formal presentations, brochures, newsletters and meetings. The majority of projects have involved partnerships with landowners, agencies or other organizations. Committees take tours and share information with other committees. While participation in one or more of these activities in and of itself may not change a person's level of

relationship, knowledge or communication with anyone else, the sum of this activity throughout the western slope of Colorado is likely to build the capacity of individuals and communities to exchange information and cooperate to address problems, satisfy mutual needs and pursue common interests, that is, to build social capital.

As mentioned in chapter two, several studies have shown that increasing social capital can enhance a community's ability to address problems. Committees demonstrated the ability of people from diverse jobs and backgrounds to build relationships and gain knowledge from each other and from other groups. HPP committees provide examples of this occurring among stakeholders because the process provides an avenue for people to communicate and collaborate to find common ground. A sportsman commented that the HPP process helped improve relationships: "I think it has. Any time people sit down on a committee and share ideas and talk and try to understand each other better and work together to think of ideas that can help each other with different interests [it improves relationships]" (#72, Interview, November 1998). A landowner expressed that improved communication had contributed to problem solving, "HPP has opened up a good range of communication with agencies and allowed us to work together, ...we probably solved problems that probably wouldn't have been" (#32, Interview, December 1998).

> Without a doubt, there's no question it's improved communication...we picked the most vocal landowners about elk problems because we wanted to work with them and I think it helped when they saw what constraints that we (DOW) have to go by and understand the forces that pull on things. We still have some elk problems but now we're talking and understanding each other better and can work on the problems together. (Agency representative #66, Meeting, June 1997)

Over time, communication and relationships can build to extend beyond HPP activities, as discussed earlier in this section. For example, the North Fork committee reported that initially there was no trust between their committee members, and it took a year of meetings and team building activities before they were able to develop common goals and their five-year plan. In 1997, members reported that relationships between members had expanded beyond HPP activity to include planned activities, friendly telephone calls and helping one another with projects.

Although the building of social capital requires time and the participation of individuals, it is certain that through the variety of HPP's activities and projects committees are strengthening communities by creating networks and linkages that can enhance social capital in western Colorado. Moreover, HPP can have ancillary benefits to other activity.

The beneficial social and ecological outcomes of HPP are contributing to many efforts already underway throughout Colorado. There are several groups and organizations active in Colorado that have goals and objectives regarding the environment and natural resource management that complement HPP activities. Data collected from various sources indicate that the number of individuals, organizations and government agencies establishing partnerships and projects aimed at protecting and preserving natural resources has been rising (Appendix C). A few specific examples follow. Membership rose between 1990 and 1997 in several non-profit organizations in Colorado involved in environmental protection and education. This is the time period over which HPP has been active (Table 5.16). The change in Colorado's human population between 1990-1997 was 19.5%, which is lower than the percent change in organization membership. This reflects a greater interest in the environment among the existing population. Statistics from the National Survey of Fishing, Hunting and Wildlife-Associated Recreation indicate that people are spending more time and money in wildlife associated activity (Appendix C).

Table 5.16. Number of people belonging to environmental advocacy organizations in 1990 and 1997. Source: Regional directors of each organization, 1999.

Organization Membership in Colorado			
Organization	**1990**	**1997**	**Percent change**
Ducks Unlimited	6307	10,815	71.5
Pheasants Forever	800	1,731	116.4
Rocky Mountain Elk Foundation	6,550	7618	16.3
The Nature Conservancy	13,000	22,000	69.2
Western Slope Environmental Resource Council	60	192	220.0

In addition, more people have been volunteering to work on environmental projects in Colorado. Volunteers for Outdoor Colorado (VOC) is a non-profit organization that connects people with various environmentally related volunteer and internship opportunities throughout Colorado. There have been a growing number of people volunteering and

participating in workshops, and acting as instructors and crew leaders for environmental activities (Table 5.17). Moreover, the quantity of land management agencies, nonprofits and volunteers participating in the VOC program grew steadily between 1996 and 1998 (Table 5.18).

Table 5.17. Volunteer Clearinghouse statistics. Source: Volunteers for Outdoor Colorado, 1998.

VOC Statistics	1987	1992	1997
Workshop Participants	0	0	100
Volunteer Instructors	0	6	22
Youth Participants	10	40	400
Crew leaders	50	100	125
Membership	420	1,200	1,450

Table 5.18. Volunteer Clearinghouse statistics. Source: Volunteers for Outdoor Colorado, 1998.

VOC Statistics	1996	1997	1998*
Participating land management agencies and nonprofits (number)	139	163	221
Participating volunteers (number)	792 (individuals) 11 (groups)	1179 (individuals) 65 (groups)	1295 (individuals) 107 (groups)
Referrals to volunteer opportunities (number)	1547 (individuals) 1522 (groups)	5349 (individuals) 4709 (groups)	3985 (individuals) 4537 (groups)

*Partial year statistics

There have been more people enrolling property in programs aimed at preserving or restoring natural habitat. Conservation easements are one method of preserving land that has grown in popularity in Colorado. The sum of conservation easements held by five of Colorado's larger land trusts has grown over the past decade. Nearly half of the easements held by the five organizations are in counties where HPP is active (Table 5.19). The amount of land in conservation easements increased at a faster rate in HPP counties than statewide.

The Division of Wildlife Commission initiated the Ranching for Wildlife Program in 1985 to provide incentives for large property owners to manage their lands to benefit wildlife. To participate in the program, landowners must have 4,856 contiguous hectares, and agree to develop a management plan with a Division officer. The program started in 1985 and within five years, there were 219,343 hectares and 10 ranches entered in the program (Table 5.20). Since 1990 there was a larger percentage increase of land entered into the

program from HPP counties than the statewide average. As of 1997, there were 25 ranches in the program, which opened over 490,000 hectares of private wildlife habitat to limited public hunting.

Table 5.19. Number of hectares in conservation easements held by the Rocky Mountain Elk Foundation, Colorado Cattleman's Agricultural Land Trust, The Nature Conservancy, American Farmland Trust and Colorado Open Lands Trust. Source: Regional directors of respective organizations, 1998.

Conservation Easements in Colorado		
	30 HPP Counties	**All Counties**
Year	**Hectares**	
Before 1992	2,446	12,175
1992-1997	19,413	39,461
Percent change	694.7	224.1

Table 5.20. Land entered into DOW's Ranching for Wildlife Program. Source: Division of Wildlife, 1998.

Ranching for Wildlife Program		
Year	**Hectares in Program**	
	HPP Counties	All Colorado counties
Land entered program between 1986-1990	47,350	219,343
Land entered program between 1991-1997	144,879	271,547
Total in 1997	192,229	490,890
Percent change 1990-1997	306	124

CHAPTER VI
CONCLUSION

This study was conducted to evaluate a collaborative approach to mediate conflicts between parties with wildlife and livestock interests. The specific questions that are being addressed are:

1. How does HPP operate in relation to the EDR model?
2. How do the outcomes reached affect the underlying ecology?
3. By using collaborative methods, do the participants address the fundamental causes of conflict?
4. Does the collaborative approach provide more social benefits than the traditional method?
5. Does the cooperative approach build capacity within the community to address similar conflicts in the future?

Based on a combination of interviews, observation and documents, I have concluded that the Habitat Partnership Program process supports the model highlighting the factors associated with EDR success that were identified from the literature and presented in chapter two. Each of the 15 committees included the main stakeholders involved in managing the majority of resources related to conflicts involving big game. Committee organizers convened participants who had the support from their respective interest groups and who were able to make decisions representing these groups. Once convened, each group of committee members collaboratively established common goals and objectives, designed the process and procedures by which they operated and obtained wildlife and habitat information from local and scientific authorities. Together, committee members and the person with a relevant wildlife-related conflict discussed problems and explored options to resolve the conflict. All committees reached agreements by consensus. Through a combination of site visits, agency officers, hired overseers and feedback from project partners, all committees, to various degrees ensured that agreements were implemented and monitored. HPP committees supported and initiated activity aimed at managing natural resources to minimize future problems with big game, and at increasing the knowledge and skills of community members about natural resource use and management.

HPP committees funded projects that impacted local ecosystems. Habitat improvement projects were generally implemented in areas where desirable vegetation was

limited. Projects included reseeding, prescribed burns, brush manipulation, fertilization, weed control, grazing management and water developments. The 15 committees established 124 water developments, assisted with noxious weed control on 5,904 hectares and completed habitat improvement projects on 71,952 hectares of public and private land. Each group of committee members stated that the majority of habitat improvement projects met their goals of increasing desirable forage and improving animal distribution and use of vegetation. Some project partners provided committees with before and after photographs of their habitat improvement project, many of which clearly showed differences in vegetative growth. In many cases, no baseline photographs or data were available. Based on published research of similar projects, however, the types of habitat improvement projects HPP committees implemented should improve forage quantity and quality, and reduce soil erosion and noxious weed populations in management areas. While these projects improve wildlife habitat, this factor alone may not reduce the number of human problems involving big game.

To manage and facilitate big game migration, committees used a variety of new fencing strategies, including combinations of hi-tensile, electric and let-down fences. Committees went beyond repairing fence in the traditional manner to testing and implementing fencing technologies aimed at reducing long-term maintenance and damage, and providing easier crossing for big game. Between the 15 committees, 193 kilometers of new 'wildlife friendly' fence and 60 big game crossings were built. Using a white vinyl strip as the top strand on a fence is more visible to big game than the traditional barbed-wire fence, and the required lower height of the top strand is easier for wild ungulates to jump. In addition, open gates and let-down fences have eased big game migration in certain areas. Besides a few reported sightings of successful big game crossing, there is little concrete evidence whether the new fencing methods have reduced the amount of fence damage from big game crossing or the number of animals injured in jumping fences.

Committees utilized hunting strategies to manage big game populations. Two committees registered 35 ranches in the landowner referral program, which connects hunters with landowners who will allow hunting on their property. Fourteen committees initiated Distribution Management Hunts (DMH) to eliminate problem animals and expel big game from conflict areas. Colorado's elk population has been above DOW objectives throughout

the 1990s. In addition, elk have been the primary species involved in causing fence damage and forage loss. During the DMHs, hunters killed 2,092 elk and expelled, at least for a short period of time, big game from unwanted areas.

In reference to the third question, a variety of interacting social, economical and ecological factors contribute to conflicts involving big game. The 15 HPP committees funded projects aimed at addressing some of these fundamental causes. Within a community, people have diverse worldviews as to the proper balance of wildlife and human habitat, and how natural resources should be managed and utilized. The primary goal of HPP's educational projects was to increase local knowledge about natural resource management and enhance community understanding of the issues involved in wildlife-related conflicts. For educational purposes, committees sponsored 31 workshops on resource management (with 1085 attendees), developed 37 brochures on natural resource issues and conducted a variety of other educational activities, such as involving community members in restoration projects and holding meetings to discuss hunting issues. The committees who attended HRM seminars stated that they apply the information gleaned from seminars to make decisions and implement projects. There is evidence of ranchers who, after attending an HRM seminar, changed their grazing system to incorporate more holistic methods, such as rotational grazing. While it may not be possible to accurately measure the degree of success of the educational endeavors sponsored by the committees, one cannot discount the value of educational activities in addressing some of the underlying misunderstandings and causes of local conflict.

The objective of ecologically related projects was to address some of the biological factors that contribute to conflicts involving big game, including inadequate big game habitat, overpopulation of elk and wildlife 'unfriendly' fencing. There is proof that committee projects have had success in improving forage quality and quantity, reducing elk populations and installing fences that are lower in height and more visible to wildlife, there is no evidence proving that these outcomes have yielded a reduction in the number of claims for property damage as a result of big game activity.

Finally, is there a difference in social interactions between the DOW's two game damage compensation programs? The DOW's traditional game damage compensation

program is traditional in many ways, but the most important way is that it has changed little since its original implementation in 1931. The program reflects the dominance and utilitarian views prevalent at the time of its inception, in that it is focused on attempting to control various components of the ecosystem, and providing compensation or charging stakeholders when damage occurs because the dominating activity was not successful. In addition, the DOW program is adversarial and it employs top-down decision-making. As documented earlier, the DOW's traditional game damage compensation program generally involves three actors, a rancher, a local DOW manager and a DOW decision-maker. To file a claim, a landowner has to complete several forms and document property damage as a result of big game activity. With additional paperwork and a site visit, a Division officer verifies the claim. The claim is submitted to the state DOW Commission, which then adjudicates whether compensation is justified. If compensation is awarded, the compensation is generally in the form of fencing material to restore damaged fence to its original condition, or as fertilizer to make reparation for forage loss. The entire process involves little communication between the DOW and the rancher. Both Division officers and ranchers fault the traditional process for the time, paperwork and adversarial dynamics it entails. Moreover, the traditional process is ultimately ineffective in the sense that it does not prevent exactly the same damage and claim cycle from recurring year after year.

Under the traditional DOW scheme, decision-makers provide short-term solutions that generally do not take into account other components of the system. It should be pointed out however, that this reductionist character of DOW adjudications is not conscious, and therefore it is also not intentional. There has been no mechanism in place to address the underlying causes of conflicts. Each actor tends to work independently within their own means to make decisions and manage the resources that they oversee, in the course leave out of consideration the components of the larger interacting system. For example, the BLM and USFS attempt to manage for multiple use interests, including improved habitat, but have had little control over the populations of wildlife. Likewise, citizens, landowners and hunters have divergent opinions on how resources should be managed, yet have had little involvement in the decision-making process. In short, the structure of the traditional social and administrative system has provided little support for collaborating or implementing

projects with long-term benefits. Over time, big-game problems have involved little constructive interaction between stakeholders, and the conflicts evidently produced frustration and hostility between the DOW and agricultural producers.

By contrast, HPP emphasizes communication and collaboration between the main interest groups involved in wildlife-related conflicts and directly addresses some of the weaknesses of the traditional program. The fundamental objective of HPP was originally to provide an improved method for reducing or resolving conflicts between the interests of ranchers and wildlife managers as these played out on private and public property. HPP is a more holistic method for addressing these issues, and has produced outcomes that can provide long-term benefits to communities. Besides fulfilling goals specified in HPP's original guidelines, there is evidence that HPP has contributed additional outcomes with positive long-term implications: increased knowledge about resource management among the local populace, healthier ecosystems and improved relationships and communication within communities. Each step of the HPP process involves communication, interaction and collaboration between the parties involved. Ninety-four percent of committee members thought that since HPP started, communication and understanding between ranchers, sportspersons and public resource management agency officers had improved in HPP areas. In addition, there is evidence of relationships between members extending beyond HPP business to include planned activities, friendly telephone calls and helping each other with projects. Through collaborative processes such as HPP, parties develop social skills and networks that can build the capacity within communities to effectively address similar conflicts in the future. Conflict is a natural phenomenon, and unless big game species are exterminated, conflicts between people and wildlife will persist. Moreover, current trends of demographics and land use indicate that the number of wildlife-related problems is likely to increase.

Colorado Land and Demographic Trends

HPP committees are working towards minimizing wildlife-related conflicts, sharing knowledge about natural resources, improving natural habitat and building social skills among community members. While these efforts are commendable, there are general trends in Colorado that could undermine HPP progress. There is a finite quantity of land and natural

resources available in Colorado, and competition for these resources is increasing at various levels. Data on present population trends in Colorado indicate that the main competitors in this study, people, livestock and big game, are placing greater and greater demands on Colorado's natural resources. In general, the elk and cattle numbers are steady to increasing, while the sheep and deer numbers are steady to declining. However, the primary factor affecting big game is people. Colorado's human population has been growing almost exponentially, obligating more land and resources toward human services and displacing native species in the wake (statistics for each county in which HPP is active and for the state of Colorado are in Appendix D). The steady rise in the human population is uniformly evident throughout Colorado (Figure 6.1). Specifically, however, between 1990 and 2000, 161,718 newcomers moved into the 30 counties where HPP is active, a 31% increase. Additional people require more land.

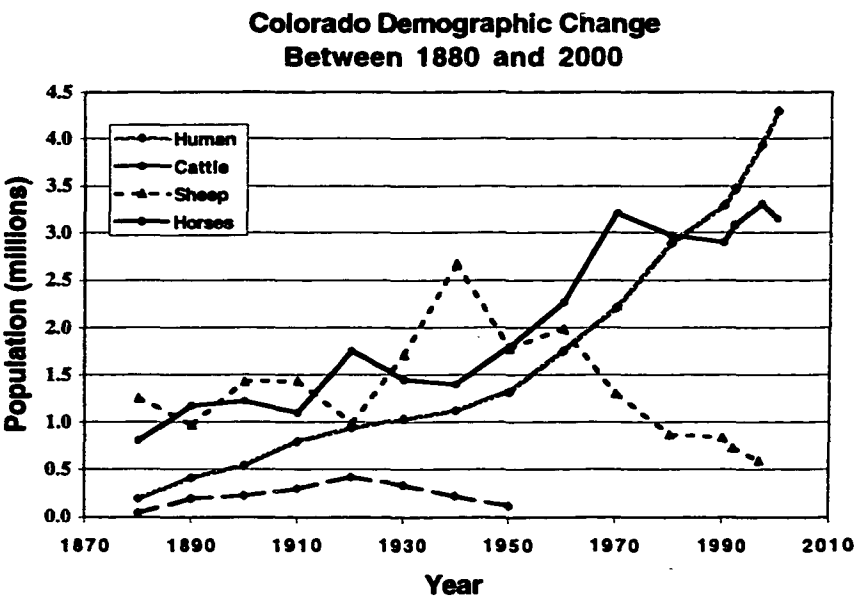

Figure 6.1 Change in population of people, cattle, sheep and horses in Colorado between 1880 and 2000. Source: Colorado Agriculture Statistics Service, 1937-2000.

Information gathered from the USDA Census shows that there are three general trends involving agricultural land in the 30 counties where HPP is active; 1) the number of farms is increasing, 2) the amount of land in agriculture is declining, and 3) the average farm

size is decreasing (Table 6.6). Between 1982 and 1997, the number of farms increased in 80 percent of the 30 HPP counties (Appendix D), while the number of farms in the remaining six counties was relatively steady, the largest decrease being five farms. In the 30 HPP counties, there was a 12.8 percent change in farm number between 1982 and 1997. The amount of agricultural land and the average farm size has been declining in a major portion of the 30 HPP counties, as well as throughout other sections of Colorado. Twenty-two of the 28 HPP counties for which the USDA census had data showed a drop in hectares of agricultural land between 1982 and 1997. Between the 28 counties, there was a decline of 338,491 hectares or a 9 percent change. The average farm size declined in 24 of the 28 HPP counties for which there were data. Encompassing the 28 counties, the average farm size decreased 128 hectares or 22 percent between 1982 and 1997.

Table 6.6. Farm data and hectares of agricultural land in Colorado. Source: USDA Census of Agriculture, 1982, 1987, 1992, and 1997.

	Area	1982	1987	1992	1997
Number of farms	30 HPP counties	10,771	11,069	11,326	12,154
	State of Colorado	27,111	27,284	27,152	28,268
Average size of farm (hectares)	30 HPP counties	574	515	529	446
	State of Colorado	501	505	507	467
Land in agriculture (hectares)	30 HPP counties	3,993,104	3,863,938	3,941,037	3,654,613
	State of Colorado	13,572,493	13,779,060	13,716,170	13,206,743

Farms are being sold and partitioned into smaller units for multiple reasons, but primarily to provide land for a rancher's children and to raise capital to pay debt (Mitchell, 2000). The continuous influx of people into Colorado, combined with people's desire to live in 'rural' areas, has driven land prices skyward. In many areas of Colorado, the value of ranchland is appreciating so rapidly that ranchers are subject to economic pressure to sell or subdivide their land, quite often for substantially more than its value as agricultural land, which itself has increased over 100% in the last decade (Appendix D). Consequently, a rancher willing to sell land can become wealthy quickly. Several ranchers mentioned that realtors and developers frequently stop and ask them to sell their land, and that the decision is a tough one. Many livestock growers, burdened with the challenges and risks of agriculture (i.e. debt, low market prices, weather, predators) and huge inheritance tax costs, question the viability of agriculture as a way of living. For some, selling the ranch may seem like a wise

decision. After developing a better understanding of the situation of ranchers, many committee sportspersons and agency representatives have commented that they wonder why more of the ranchers do not "sell out." A sportsman recognized the challenging dilemma and commented, "Some landowners feel like they are hitting a dead wall with the amount of money they make and often their only option is to sell the land and of course that would put it into developments" (#62, Meeting, July 1998).

Committee members acknowledged that all of HPP's efforts could not stop development and the influx of people, nor stop ranchers from selling agricultural land. An agency representative synthesized the comments of many committees' comments.

> If the landowners are happy then it partially worked, but there aren't any projects that can affect the incoming movement of people and developments. The projects aren't enough to help ranchers stay in business and not sell their ranches for the large amounts of money that people are willing to pay. (#17, Meeting, August 1998)

Ranch land is frequently developed into 'ranchettes,' (16-20 hectare parcels) and other subdivisions. Smaller properties are inimical to wildlife interests because they make it more difficult to manage habitat, wildlife and migration routes. In addition, increased human activity makes areas less hospitable to big game. Keeping land in agriculture helps preserve habitat and open space, and often provides winter forage for big game. An agency representative commented: "No matter how bad range is managed it is better than a condo on it" (#108, Meeting, June 1998).

Reason for Change and Concern

As noted above, population growth and development is consuming open space and wildlife habitat, and while these factors, in and of themselves, may be outside the purview of HPP, these represent subsidiary challenges for HPP. Many associated effects are obvious, such as the loss of habitat for native fauna and flora, and more human tread on landscapes, particularly on public land. While these factors may directly counter HPP projects, there are other aspects that affect HPP decisions and activity indirectly. For example, the number of conflicts involving big game are increasing and surfacing in new areas, especially where the number of people and developments has increased. The spreading developments complicate

hunting, a necessity in managing big game populations. Committees reported that in areas where Distribution Management Hunts were successfully used in the past, new housing developments make hunting less safe, and in some cases, not feasible. Also, the increasing amounts of people and motorized activity on public land, which mars habitat and influences elk distribution, contributes to committee challenges. At an HPP meeting in August 1997, USFS recreation staff from the Crested Butte area reported that there were 1200 mountain bikers using forest trails daily, and that the elk were not using forage in the area but roaming to lower altitudes and onto private land.

HPP efforts are building social capital and attempting to address some of the underlying causes of wildlife-related conflicts. However, these advances may be limited if the current trends in human population and agricultural land continue unabated. The fundamental underlying factor contributing to these conflicts are people's use and management of the natural environment. The team of leaders who initiated HPP identified the primary stakeholders (committee members) based on the traditional interest groups involved in wildlife-related conflicts in the 1940s. Time has changed, however, and a more diverse set of interest groups inhabits Colorado, each of which affects the management and use of local resources. To more effectively and holistically manage local resources, other interest groups, such as developers, county and city planners, and non-agricultural landowners, should be active participants in the HPP process. This interaction could instigate change in how local resources are managed.

Presently, only 22 of the 30 HPP counties have wildlife and habitat provisions in county master plans and land use codes, and the degree to which this information is utilized varies greatly between counties (Appendix D). While planning commissions generally send subdivision and Planning and Urban Development (PUD) proposals to agencies such as the NRCS and DOW for review and comments, the reviewing agencies generally cannot deny a development proposal. However, reviewers can make suggestions for planning and zoning commissions to consider. County planners told me that reviewers' comments generally provide information on possible concerns that may arise as a result of a proposal and provide suggestions to help alleviate future problems. Those interviewed reported that agency suggestions frequently include creating specifications such as specific garbage containers to

deter bears, bells on domestic cats to forewarn birds and measures to restrain domestic dogs from chasing wildlife.

While these suggestions are useful, involving additional stakeholders in HPP could expand communication beyond bells on cats to involve discussion between parties that would allow HPP committees and communities to establish common goals and more effectively advance these goals. For example, inclusion in meetings and discussion could provide county planners with a better understanding of local natural resource issues and concerns, and provide committees with planning and other information that could help guide their decisions and projects for reducing wildlife-related problems. Moreover, increased communication and collaboration could provide mechanisms to keep land in agriculture and ranchers in business.

In conclusion, HPP provides a model of EDR, but also of collaborative natural resource management, which, with some adjustment, can be utilized in different scenarios. For example, other Rocky Mountain States have similar problems between parties with wildlife and livestock interests. Moreover, across the U.S., as cities continue to expand and more people move to rural areas, agricultural land is being taken out of production, which not only impacts native flora and fauna, but affects the future production of agricultural goods, at a time when supplying sufficient food for the growing human population is a global concern. To better critique HPP progress, it would be useful for committees to record additional information, including the number of ranchers who bring claims to HPP, and the number of partners with whom projects were funded. Also useful would be baseline data or photographs of projects that affect habitat or big game. Including additional stakeholders, such as county planners and ranchette owners, could allow HPP to more effectively address wildlife-related conflicts. Involving more people would change the dynamics of HPP and may increase the challenges of the people involved, however, the benefits are likely to be worth the effort. While HPP provides an example of how collaboration can benefit communities, many traditional social structures are not presently organized to facilitate collaborative approaches to resolving problems, and therefore may need to be adjusted.

APPENDIX A

INTERVIEW QUESTIONS

Committee Interview Questions

- What types of projects has the committee funded?
- How do you decide which projects to fund? Are there certain criteria?
- How and by whom are project proposals presented to the committee? Has there been a many people coming with conflicts?
- How did the committee develop their budget proposal?
- Does the committee have base line data on the areas where the committee did projects?
- Does the committee take photographs of the projects?
- How does the committee monitor the projects?
- Does the committee monitor vegetation? big game?
- Has there been any projects that didn't work as well as the committee expected?
- Has the committee tried any new ideas?
- How does the committee measure whether a project is successful?
- Has the committee been satisfied with the projects?
- Have the partnering landowners been satisfied with the results?
- Are all of the projects with partners? Who have been some of the partners?
- How does the committee ensure that projects are implemented?
- How did the wheat land enrolled in CRP affect the distribution of elk?
- Has the committee assisted with conservation easements?
- Has the committee had seminars or educational programs? What type?
- How many people attended? What organizations were represented?
- How does the committee inform the community of HPP activities?
- Does the committee print HPP activities in local newspapers?
- Has the committee developed brochures?
- Is there a chair of the committee? How was this person chosen?
- When the committee first started, how were the landowners and sportsperson chosen?
- At the initial meetings, did the committee have assistance from a facilitator?
- Has the committee hired consultants? Fence crews? A secretary? How was this done?
- Who in the community was sent HPP questionnaires? How was this decided?
- Were surveys mailed to community members only once? Were the respondents contacted?
- Do you have ideas to improve HPP?
- Does the committee work with other HPP committees or organizations?
- How would you describe the communication between agencies, sportspersons and landowners before HPP?
- What problems has the committee encountered?

Phone interview questions

- In the last year or so, have you met with other committee members outside of the regular meetings?
- Have you referred anyone, like a landowner or someone, to someone on the committee for information?
- Do you ever contact other committee members if you have new idea or a question about something?
- Have any of the committee members referred someone to you?
- Do you think communication has changed between the interest groups?

APPENDIX B

HPP COMMITTEE BUDGET AND PROJECT DATA

Table B.1. Middle Park projected budget in Distribution Management Plan.

	Percent Budget Projected for Fiscal Year						
Middle Park	**1990-1991**	**1991-1992**	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**
Habitat Improvement	48%	51%	62%	64%	67%	55%	54%
Salting	4%	4%	5%	6%	7%		
Lease						2%	3%
Fence Repair	25%	26%	16%	13%	10%	18%	16%
Monitoring	17%	17%	17%	17%	17%	7%	20%
Seminars						15%	3%
Administration						2%	2%

Table B.2. Middle Park annual expenditures in dollars followed by the percent of the annual budget

	Fiscal Year Expenditure ($)							
Middle Park	**1990-91**	**1991-92**	**1992-93**	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**Total expenditures**
Annual Expenditure	48,500	55,000	62,150	59,475	17,538	59,033	56,215	357,911
Habitat Improvement	48,500 (100%)	54,500 (99%)	51,425 (83%)	45445 (76%)	1616 (9%)	17389 (30%)	3483 (6%)	222358 (62%)
Fencing			3600 (7%)	2495 (4%)	6772 (39%)	14510 (25%)	34534 (62%)	61911 (17%)
Seminars					3143 (18%)	9762 (17%)	178 (0.3%)	13083 (4%)
Monitoring			7000 (11%)	4500 (6%)	4140 (24%)	9097 (15%)	12492 (22%)	37229 (10%)
Other*	0	500	125 (0.2%)	7035 (12%)	1867 (11%)	8275 (14%)	5528 (10%)	23330 (7%)

*Other includes administration, leasing ground, access costs, salt, and baiting (hay).

Table B.3. North Fork projected budget in Distribution Management Plan.

	Percent Budget Projected for Fiscal Year						
North Fork	**1990-1991**	**1991-1992**	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**
Habitat Improvement	75%	75%	75%	75%	75%	50%	50%
Fencing	13%	13%	13%	13%	13%	30%	30%
Education	12%	12%	12%	12%	12%	5%	5%
Research/Monitoring						10%	10%
Other						5%	5%

Table B.4. North Fork annual expenditures in dollars followed by the percent of the annual budget

	Fiscal Year Expenditures ($)							
North Fork	**1990-91**	**1991-92**	**1992-93**	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**Total expenditures**
Annual Expenditure	40,029	44,733	47,590	72,904	93,518	125,805	66,595	491,174
Habitat Improvement	27,429 (69%)	12,133 (27%)	20,025 (42%)	40,039 (55%)	74,909 (80%)	98,160 (78%)	42,622 (64%)	315,317 (64%)
Fencing	9,000 (22%)	25,000 (56%)	17,837 (38%)	13,624 (19%)	15,434 (17%)	14,940 (12%)	16,583 (25%)	112,418 (23%)
Seminars / Brochures		3000 (7%)		10,000 (14%)		550 (0.4%)	483 (0.7%)	14,033 (3%)
Monitoring			6,369 (13%)	2,505 (3%)	175 (0.2%)	7140 (6%)	2,291 (3.4%)	18,480 (4%)
Other	3,600 (9%)	4,600 (10%)	3,359 (7%)	6,736 (9%)	3,000 (3%)	5,015 (4%)	4,616 (7%)	30,926 (6%)

*Other includes administration, leasing ground, access costs, salt, and baiting (hay).

Table B.5. North Park projected budget in Distribution Management Plan

	Percent Budget Proposed for Fiscal Year				
North Park	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**
Habitat Improvement	37%	46%	47%	68%	62%
Fencing	59%	49%	42%	21%	22%
Salting	1%	1%	1%	1%	1%
Leasing					1%
Administration	2%	3%	3%	3%	3%

Table B.6. North Park annual expenditures in dollars followed by the percent of the annual budget

	Fiscal Year Expenditures ($)					
North Park	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**Total expenditures**
Annual Expenditure	56,765	27,369	76,823	45,477	33,106	239,540
Habitat Improvement	18,949 (33%)	10,776 (40%)	4,290 (6%)	4,690 (10%)	180 (1%)	38,885 (16%)
Fencing	30,061 (53%)	15,718 (58%)	54,815 (71%)	38,329 (84%)	28,664 (87%)	167,587 (70%)
Seminars			3,143 (4%)	2,137 (5%)		5,280 (2%)
Monitoring	7,237 (13%)		4,140 (5%)		2,018 (6%)	13,395 (6%)
Other	518 (1%)	875 (3%)	10,435 (14%)	321 (1%)	2,244 (7%)	14,393 (6%)

*Other includes administration, leasing ground, access costs, salt, and baiting (hay).

Table B.7. Sangre de Cristo projected budget in Distribution Management Plan.

	Percent Budget Proposed for Fiscal Year				
Sangre de Cristo	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**
Habitat Improvement	56%	61%	65%	65%	65%
Fencing					
Salting	2%	2%	2%	2%	2%
Seminars/Education	20%	20%	18%	18%	18%
Monitoring	20%	15%	13%	13%	13%
Administration	2%	2%	2%	2%	2%

Table B.8. Sangre de Cristo annual expenditures in dollars followed by the percent of the annual budget spent.

	Fiscal Year Expenditures ($)					
Sangre de Cristo	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**Total expenditures**
Annual Expenditure	15,308	50,535	39,603	8,951	31,347	145,744
Habitat Improvement	2,150 (14%)	14,929 (30%)	12,620 (32%)	5,000 (56%)	11,102 (35%)	45,801 (31%)
Fencing						
Seminars/Brochures	10,987 (72%)	18,982 (38%)	9,450 (24%)	3,748 (41%)	5,708 (18%)	48,875 (31%)
Monitoring	1,534 (10%)	12,351 (25%)	17,129 (43%)		5,000 (16%)	36,014 (24%)
Easements					8,000 (26%)	8,000 (5%)
Other	637 (4%)	4,273 (9%)	404 (1%)	203 (2%)	1,537 (5%)	7,054 (5%)

*Other includes administration, leasing ground, access costs, salt, and baiting (hay).

Table B.9. Gunnison Basin projected budget in Distribution Management Plan

	Percent Budget Proposal for Fiscal Year				
Gunnison Basin	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**
Habitat Improvement	25%	30%	40%	45%	50%
Fencing	40%	30%	15%	10%	10%
Leasing	15%	15%	10%	10%	10%
Seminars/Education	10%	15%	20%	20%	15%
Access	4%	4%	9%	9%	9%
Administration	5%	5%	5%	5%	5%

Table B.10. Gunnison Basin annual expenditures in dollars followed by the percent of the annual budget

	Fiscal Year Expenditures ($)					
Gunnison Basin	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**Total expenditures**
Annual Expenditure	27,085	77,899	148,338	53,248	58,106	364,676
Habitat Improvement	6,730 (25%)	26,472 (34%)	88,237 (60%)	10,643 (20%)	25,211 (43%)	157,293 (43%)
Fencing	3,565 (13%)	8,223 (11%)	30,434 (21%)	17,002 (32%)	14,357 (25%)	73,581 (20%)
Seminars/Brochures		2,945 (4%)	2,500 (2%)		2,500 (4%)	7,945 (2%)
Monitoring	3,587 (13%)	19,179 (25%)	3,608 (2%)	22,266 (42%)	2,793 (5%)	51,433 (14%)
Other	13,203 (49%)	21,080 (27%)	23,559 (16%)	3,337 (6%)	13,245 (23%)	74,424 (20%)

*Other includes administration, leasing ground, access costs, salt, and baiting (hay).

Table 5.11. Annual expenditures of 15 HPP committees on fence and habitat projects of since 1990

HPP Committee	Project type	Annual expenditures ($)						
		1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
North Fork	Habitat Improvement	27,429	12,133	20,025	40,039	74,909	98,160	42,622
	Fencing	9,000	25,000	17,837	13,624	15,434	14,940	16,583
Middle Park	Habitat Improvement	48,500	54,500	51,425	45,445	1,616	17,389	3,483
	Fencing	0	0	3,600	2,495	6,772	14,510	34,534
Sangre de Cristo	Habitat Improvement		2,150	14,929	12,620	5,000	11,102	45,801
	Fencing		0	0	0	0	0	0
North Park	Habitat Improvement			18,949	10,776	4,290	4,690	180
	Fencing			30,061	15,718	54,815	38,329	28,664
Northwest	Habitat Improvement				2814	0	52104	51573
	Fencing				11325	0	2700	2708
Gunnison Basin	Habitat Improvement			6,730	26,472	88,237	10,643	25,211
	Fencing			3,565	8,223	30,434	17,002	14,357
South Park	Habitat Improvement				1071	8071	68	21784
	Fencing				18879	119	17477	1274
Lower Colorado River	Habitat Improvement				0	3129	0	27771
	Fencing				8430	28181	39439	4508
Yampa/White River	Habitat Improvement					10000	73107	88910
	Fencing					0	33028	0
Upper Yampa River	Habitat Improvement					9898	0	299
	Fencing					217	3857	46028
Arkansas River	Habitat Improvement						0	2142
	Fencing						15421	19635
San Juan Basin	Habitat Improvement					3000	7941	86748
	Fencing					0	6027	3968
San Luis Valley	Habitat Improvement							0
	Fencing							14685
Grand Mesa	Habitat Improvement							0
	Fencing							1246
Uncompaghre	Habitat Improvement							5000
	Fencing							0
Totals		**84,929**	**93,783**	**167,121**	**217,931**	**344,122**	**477,934**	**589,714**

Table B.12. Questions and responses to questionnaires distributed at the end of initial 5-year period by three HPP committees. Source: Middle Park, North Fork and North Park committee documents, July 1998.

Question	Middle Park (March 1995)	North Fork (March 1995)	North Park (April 1997)
Number mailed / Number responses	81 / 55 (68% returned)	90 / 26 (28%)	252 / 49 (20% returned)
Are you familiar with HPP?	Yes – 46 (85%) No – 8 (15%)	Yes – 15 (63%) No – 9 (37%)	Yes - 34 (75%) No – 11 (25%)
What parts of the program have you used?	Distribution hunts - 23 Stackyards 7 Fencing materials - 4 Gates - 2	Fertilizer - 4 Fence - 3 Special hunts - 1 Vegetation manipulation - 1 Stackyard - 1 Ponds - 1	Stackyards - 13 Fence materials - 12 New fence design -10 DMH - 7 Grazing management systems - 6 HRM seminar - 5
Has HPP helped reduce fence and forage damage/conflicts with wildlife?	Yes – 32 (74%) No – 4 (10%) Don't know – 7 (16%)	Yes –14 (93%) No – 1 (7%)	Yes – 22 (58%) No – 2 (5%) Don't know – 14 (37%)
What parts of the program have been worthwhile?	Distribution hunts - 11 Providing fencing - 5 All parts - 2 Fertilization - 2 Gates - 2 Stackyards - 2 Improved communication - 1 Education - 1	Fertilizer - 4 Awareness - 4 Stackyard - 2 Road closure - 2 Improve forage - 1 Burn and reseed	Stackyards - 15 Fence materials - 11 DMH - 8 New fence designs -11 HRM seminar - 6 Grazing management systems - 5
Do you feel adequately represented by the Committee?	Yes – 27 (54%) No – 5 (10%) Unknown – 18 (36%)	Yes – 14 (67%) No – 1 (5%) Don't know – 6 (29%)	Yes – 17 (57%) No – 4 (5%) Don't know – 19 (38%)
Are you currently having problems with elk?	Yes – 42 (80%) No – 10 (20%)	Not asked	Yes – 24 (62%) No – 15 (38%)
What is the nature of your conflict with elk?	Too many elk/forage 31 Fence damage - 22 Problems in hay meadows - 6 Hay loss – 3	Not asked	Fence damage - 21 Hunting season - 4 Forage - 4 Growing hay - 3 Trees - 2
Do you feel problems are due to having too many elk, or elk being in the wrong places?	Size of population - 14 Elk distribution - 6 Both - 14 Neither - 2	Distribution - 15 Population - 2 Neither - 2	Too many - 13 Wrong place - 13 Both - 4
Has there been a change in your elk problem?	More – 13 (28%) Same – 22 (48%) Fewer - 11 (24%)	Not asked	More – 9 (26%) Same – 12 (34%) Fewer – 14 (40%)

Has anything besides HPP contributed to this change?	Mild winters - 3 Home building - 1 Do not know - 1 No - 1	Snow depths Migration routes change Longer hunting seasons Too many ATVs Road Closures Human activities Smaller elk herd Mild winter conditions Hunting pressure	Elk have adjusted Elk using different range for winter More elk More people Elk have changed their patterns
What is the forage condition and trend on your ranch?	Improving - 10 Declining - 13 Stable - 21 Unknown - 5	Not asked	Improving - 14 Declining - 1 Stable - 2 Unsure - 6
Would you be interested in any training to help you assess the forage trend on your ranch?	Very interested - 10 Might participate - 31 Not interested - 8	Yes - 4 No - 6 (get habitat assessment)	Very much interested - 8 Might participate - 13 Not interested - 16

APPENDIX C

ENVIRONMENTAL ASSOCIATED ACTIVITY IN COLORADO

Table C.1. Rocky Mountain Elk Foundation statistics in Colorado. Source: Rocky Mountain Elk Foundation, 1999.

Year	Membership	Events	Attendance
1990	6550	11	2493
1991	6868	16	4005
1992	5902	14	3970
1993	6126	15	4305
1994	7041	18	5139
1995	7359	17	5069
1996	7405	19	5830
1997	7618	20	5900

Table C.2. Colorado residents who participated in wildlife related recreation in 1991 and 1996. Source: National Survey of Fishing, Hunting and Wildlife-Associated Recreation, 1991 and 1996.

Colorado Resident Participation in Wildlife Associated Recreation				
		1991**	1996**	Percent Change
Participants in Nonconsumptive Activities	Total Number	1,161	1,244	7.15
	Total percent of population	46	42	
	Nonresidential* number	571	603	5.60
	Nonresidential percent of population	23	21	
	Residential number	1,092	1,187	8.70
	Residential percent of population	43	41	

*Nonresidential refers to those persons who took trips or outings of at least one mile for the primary purpose of observing, feeding or photographing fish and wildlife. Residential includes those persons who participated in wildlife related activities within one mile of their home.
** Numbers in thousands

Table C.3. Number of days of resident and nonresident participation in wildlife-watching activities. Source: National Survey of Fishing, Hunting and Wildlife-Associated Recreation, 1991 and 1996.

Days of Participation in Nonconsumptive Wildlife Activity in Colorado			
	1991*	1996*	Percent Change
Participation by residents and nonresidents (total days)	9,037	11,328	25.35
Days by residents	5,359	8,282	54.54
Percent of total residents	59	73	
Days by nonresidents	3,678	3,046	-17.18
Percent of total nonresidents	41	27	

*Numbers in thousands

Table C.4. Number of residents and nonresidents participating in wildlife watching activities in Colorado. Source: National Survey of Fishing, Hunting and Wildlife-Associated Recreation, 1991 and 1996.

Number of Participants in Nonconsumptive Wildlife Activity in Colorado	1991*	1996*	Percent Change
Total number of resident and nonresident participants**	1,164	1,042	-10.48
Number of Residents	508	558	9.84
Percent of Total	44	54	22.73
Number of Nonresidents	656	484	-26.22
Percent of Total	56	46	-17.86

* Numbers in thousands

**Includes only those 16 years of age and older.

Table C.5. Number of resident and nonresident hunters in Colorado. Source: National Survey of Fishing, Hunting and Wildlife-Associated Recreation, 1991 and 1996.

Resident and Nonresident Hunters in Colorado	1991*	1996*	Percent change
Total number of sportspersons**	639	732	14.55
Percent of population	25	25	
Total hunters in Colorado	348	454	30.46
Number Residents	194	237	22.16
Percent of total	56	52	
Number of nonresidents	155	217	40.00
Percent of total	44	48	
Number of big game hunters	286	411	43.71
Percent of total hunters	82	91	
Number of small game hunters	89	99	11.24
Percent of total hunters	25	22	

*Numbers in thousands

** Sportspersons includes people involved in either fishing or hunting.

Table C.6. Expenditures of wildlife related activities in Colorado in 1991 and 1996. Source: Department of the Interior, Fish and Wildlife Service, 1991 and 1996.

Expenditures of Colorado Residents for Wildlife Associated Activity				
		1991 expenditures ($)*	**1996 expenditures ($)***	**Percent Change**
Total wildlife associated expenditures in Colorado (consumptive and nonconsumptive)	Total	896,002	2,184,869	144
	Trip related	340,980	741,052	117
	Equipment	495,545	1,261,312	155
	Other**	59,476	182,505	207
Fishing and hunting expenditures	Total	518,444	1,504,931	190
	Trip related	208,912	420,261	101
	Equipment	262,827	1,018,760	288
	Other**	46,706	65,911	41
Nonconsumptive wildlife expenditures	Total	377,557	679,938	80
	Trip related	132,068	320,791	143
	Equipment	232,718	242,553	4
	Other	12,770	116,594	813
Total hunting expenditures	Total of all expenditures	154,499	659,711	327
Hunting trip related expenditures	Total trip related	50,155	231,227	361
	Food and lodging	27,929	113,124	305
	Transportation	19,049	72,209	279
	Other**	3,177	45,894	1345
Hunting equipment related expenditures	Total equipment	74,187	328,850	343
	Hunting equipment	49,809	165,047	231
	Auxiliary equipment	15,600	27,528	76
	Other**	30,157	99,634	230

*Numbers in thousands

**Other refers to magazine subscriptions, memberships dues and contributions, land leasing and ownership, and licenses, tags and permits.

Table C.7. Estimated resident and nonresident hunting expenditures in Colorado. Source: Division of Wildlife Hunting and Fishing Industries Economic Impact Model Summary Report, November 1990, September 1992, July 1995, December 1997.

Resident and Nonresident Direct and Secondary Expenditures					
	1990*	1992*	1995*	1997*	Percent change 1990-1997
Deer Hunting Expenditures in 30 HPP counties	46,808	14,082	55,173	45,350	-3.11
Deer Hunting Expenditures in state of Colorado	89,075	98,978	106,674	84,818	-4.78
Elk Hunting Expenditures in 30 HPP counties	50,672	14,842	60,158	83,119	64.03
Elk Hunting Expenditures in state of Colorado	94,422	104,209	113,048	157,766	67.09
Total Expenditures in 30 HPP counties**	501,454	235,462	624,706	646,866	29.00
Total Expenditures in state of Colorado	1,322,556	1,609,014	1,685,945	1,731,487	30.92

*In thousands of dollars

**Total Expenditures include all direct expenditures of deer, elk, other big game, small game, fishing and DOW direct, and secondary expenditures

Table C.8. Estimated number of resident and nonresident big game hunters in Colorado. Source: Division of Wildlife Hunting and Fishing Industries Economic Impact Model Summary Report, November, 1990, September 1992, July 1995, December, 1997.

Resident and Nonresident Big Game Hunters in Colorado					
	1990*	1992*	1995*	1997*	Percent change 1990-1997
Total number of big game hunters in 30 HPP counties	344,513	342,888	341,680	347,778	0.95
Total number of big game hunters in Colorado	433,136	433,145	433,150	436,971	0.89
Percent of all big game hunters in HPP counties	79.54	79.16	78.88	79.59	0.06

TableC.9. Colorado land protected by conservation programs in Land Trusts. Source: Colorado Coalition of Land Trusts Report, 1993 and 1997.

Amount of Colorado Land Protected in Conservation Programs			
	Hectares		Percent Change
Type of conservation program	1993	1997	
Fee Ownership	5,084	17,199	238.3
Conservation Easement	19,499	51,258	162.9
Fee Ownership and Transferred to Third Party	31,714	11,891	-62.5
Preserved by Other Method*	1,060	25,509	2,306.5
Total Acres Protected	57,358	105,856	84.6

* Other may include leases, termed conservation easements and other methods.

Table C.10. Grants allocated through the Great Outdoors Colorado Trust Fund between 1994 and 1998. Source: Great Outdoors Colorado Progress Report, 1997 and 1998.

Type of Grants	Projects Funded	GOCO Award ($)	Partner Contributions ($)
Outdoor Recreation Program	124	14.8 million	57 million
Wildlife Program	118	16.7 million	34.4 million
Open Space Land Conservation	84	21.4 million	76.4 million
Planning and Capacity Building	152	4.8 million	9.7 million
Local Governments	323	11.6 million	49 million
Trails	179	5 million	22.8 million
Legacy Projects	15	68.2 million	189 million
Legacy Planning Projects	7	333,500	274,000
Grant Totals	1002	142.6 million	438.5 million

Table C.11 Water quality nonpoint source program activity between 1990 and 1997. Source: Water Quality Control Division of the Colorado Department of Public Health and Environment Annual Report, 1997.

Water Quality Nonpoint Source Program			
Fiscal Year	**Funding provided (U.S. Dollars)**	**Projects in Colorado (number)**	**Projects in HPP areas (number)**
1990	512,582	7	4
1991	684,083	15	13
1992	798,187	15	10
1993	906,688	18	13
1994	1,039,210	9	7
1995	1,404,433	13	7
1996	1,387,260	14	11
1997	1,259,200	15	8

Table C.12. Responses of county planners who were interviewed in 1998 about whether their county's master plan and land use code contains wildlife or habitat protection elements or provisions.

HPP County	County Planner Response
Alamosa	Yes
Archuleta	To some degree
Chaffee	We have a new plan, there is some but not much
Conejos	Little in the old plan – but we do
Custer	No it was deleted but we have a new plan in the works
Delta	No, but we're making new plan
Fremont	Not really
Garfield	Yes
Grand	Yes
Gunnison	Yes
Hinsdale	No
Huerfano	It's referred to
Jackson	It has some but we removed some
Lake	Not really but we contact DOW for PUD
La Plata	Yes
Mesa	Yes
Mineral	Not right now, using 1976 plan but developing new one
Moffat	Not really but there is some wording
Montrose	Some mention of it, but only words
Ouray	Yes
Park	Yes
Pueblo	No, we tried but it was "hammered"
Rio Blanco	Yes
Rio Grande	Yes
Routt	Yes in our new plan
Saguache	Yes
San Juan	Yes
San Miguel	Yes
Summit	We have it, but do we use it?
Teller	Some language

APPENDIX D

COLORADO DEMOGRAPHIC DATA

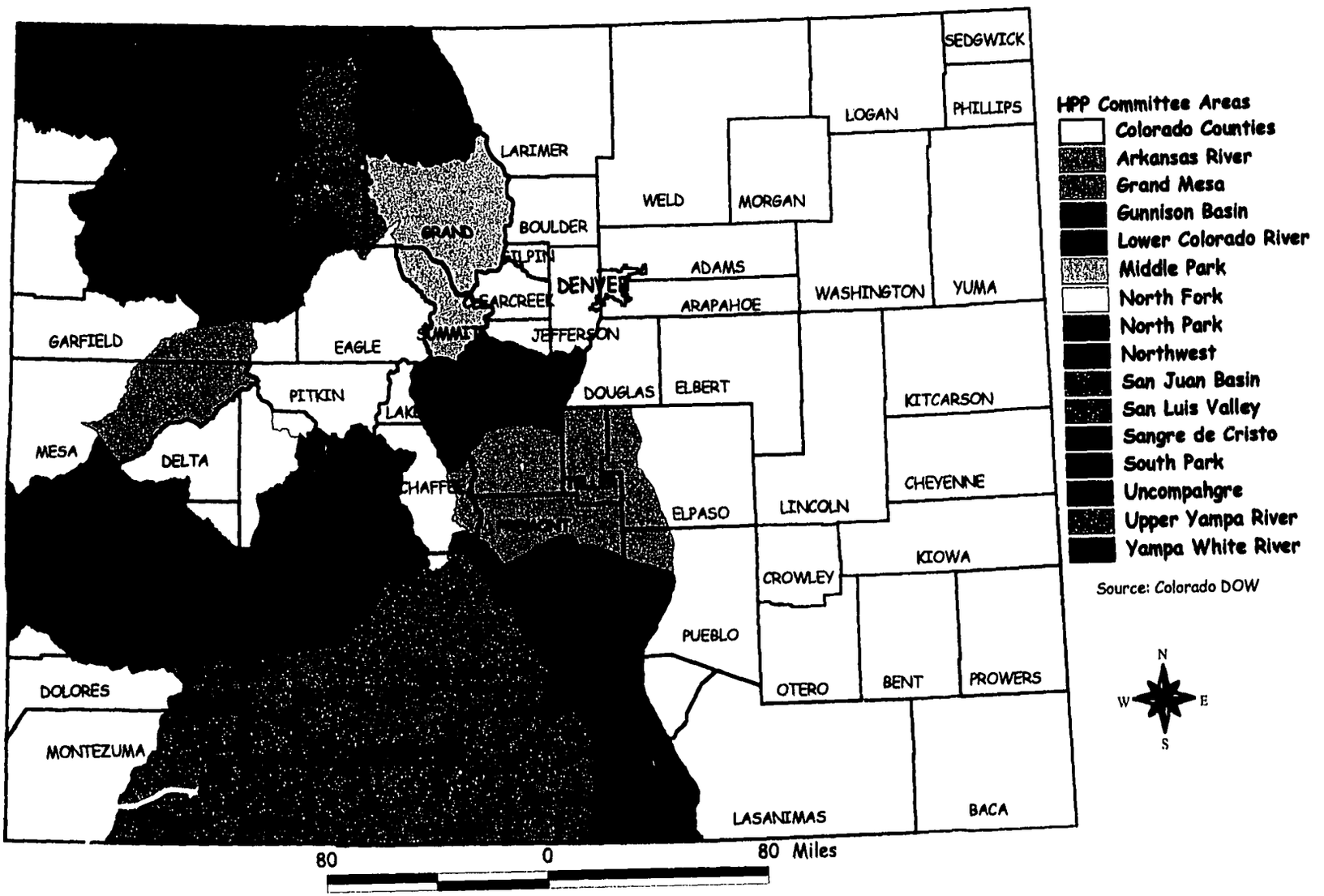

Figure D.1. Map of state of Colorado showing 63 counties and 15 HPP committee management areas.

Table D.1. Human population change for each county in which HPP is active and for the State of Colorado. Source: USDA Census, 1980, 1990 and 1997.

	Human population				
	Percent Change			Net Change	
HPP County	**1980-1990**	**1980-1997**	**1990-1997**	**1980-1997**	**1990-1997**
Alamosa	15.41	33.09	15.32	3,904	2,086
Archuleta	45.88	133.11	59.79	4,877	3,196
Chaffee	(4.11)	18.82	23.90	2,489	3,032
Conejos	(4.38)	1.12	5.74	87	428
Custer	26.05	110.73	67.19	1,692	1,294
Delta	(1.15)	22.40	23.83	4,754	4,999
Fremont	12.54	47.78	31.31	13,702	10,105
Garfield	33.13	69.90	27.62	15,738	8,278
Grand	6.57	32.16	24.01	2,404	1,913
Gunnison	(3.89)	15.14	19.80	1,618	2,034
Hinsdale	14.46	75.00	52.89	306	247
Huerfano	(6.69)	17.03	25.43	1,097	1,528
Jackson	(13.85)	(4.94)	10.34	(92)	166
La Plata	18.71	50.54	26.81	13,744	8,655
Lake	(31.97)	(5.97)	38.22	(527)	2,296
Mesa	14.25	35.74	18.81	29,138	17,523
Mineral	(30.60)	(15.55)	21.68	(125)	121
Moffat	(13.52)	(5.09)	9.75	(669)	1,107
Montrose	0.29	27.28	26.91	6,644	6,573
Ouray	19.22	69.56	42.22	1,339	969
Park	34.52	135.95	75.40	7,250	5,409
Pueblo	(2.32)	6.27	8.79	7,898	10,819
Rio Blanco	(4.52)	13.78	19.17	862	1,145
Rio Grande	2.46	14.52	11.76	1,526	1,267
Routt	5.10	29.42	23.14	3,944	3,260
Saguache	17.38	50.22	27.97	1,976	1,292
San Juan	(10.56)	(33.25)	(25.37)	(277)	(189)
San Miguel	14.44	74.40	52.40	2,375	1,914
Summit	45.58	112.59	46.03	9,962	5,929
Teller	55.19	147.55	59.51	11,854	7,420
HPP County Average	8.45	42.64	29.01	4,983	3,827
State of Colorado	14.00	36.18	19.46	1,045,597	640,938

Table D.2. Human population per square kilometer of private land in each HPP county between 1980 and 1997. Source: USDA Census, 1980, 1990 and 1997; Geospatial and Statistical Information Data Center, 1998.

	Human Population Density				
	Year			Percent Change	
HPP County	1980	1990	1997	1990 -1997	1980-1997
Alamosa	8	9	10	15	33
Archuleta	2	3	5	60	133
Chaffee	21	20	25	24	19
Conejos	6	5	6	6	1
Custer	1	2	3	67	111
Delta	15	15	19	24	22
Fremont	13	15	19	31	48
Garfield	7	10	13	28	70
Grand	5	5	7	24	32
Gunnison	7	7	9	20	15
Hinsdale	3	4	5	53	75
Huerfano	2	2	2	25	17
Jackson	1	1	1	10	(5)
La Plata	113	134	170	27	51
Lake	3	2	3	38	(6)
Mesa	35	40	47	19	36
Mineral	3	2	3	22	(16)
Moffat	2	2	2	10	(5)
Montrose	14	14	18	27	27
Ouray	3	3	4	42	70
Park	2	3	5	75	136
Pueblo	22	21	23	9	6
Rio Blanco	3	3	3	19	14
Rio Grande	10	11	12	12	15
Routt	4	4	5	23	29
Saguache	1	2	2	28	50
San Juan	7	6	4	(25)	(33)
San Miguel	2	3	4	52	74
Summit	39	56	82	46	113
Teller	10	16	26	60	148
Average HPP counties	12	14	18	29	43
State of Colorado	17	19	23	19	36

Table D.3. Average dollar value of agricultural land in Colorado. Source: USDA Census of Agriculture, 1987, 1992, and 1997.

Average Dollar Value Per Hectare of Agricultural Land				
	Year			Percent change
HPP County	1987	1992	1997	1987-1997
Alamosa	1,616	1,505	2,876	78.0
Archuleta	1,596	2,132	4,087	156.0
Chaffee	1,759	2,125	4,317	145.4
Conejos	1,357	1,362	1,621	19.5
Custer	1,189	1,322	1,386	16.6
Delta	1,779	2,654	4,757	167.4
Fremont	872	1,203	2,212	153.5
Garfield	1,189	1,730	2,810	136.4
Grand	1,117	1,364	2,459	120.1
Gunnison	1,349	2,174	2,852	111.4
Hinsdale	3,151	2,923	3,417	8.5
Huerfano	558	709	855	53.1
Jackson	D	1,515	924	
La Plata	1,408	1,384	2,515	78.6
Lake	2,061	1,510	2,412	17.0
Mesa	1,935	2,016	5,053	161.2
Mineral	1,334	2,056	2,814	110.9
Moffat	450	591	1,651	267.0
Montrose	1,322	1,871	3,415	158.3
Ouray	1,497	2,810	3,640	143.1
Park	892	1,045	1,275	42.9
Pueblo	625	751	1,164	86.2
Rio Blanco	677	1,030	1,312	93.8
Rio Grande	1,821	2,454	3,128	71.8
Routt	1,097	1,285	2,387	117.6
Saguache	932	1,021	1,591	70.8
San Juan	D	D	D	
San Miguel	937	1,703	1,698	81.3
Summit	1,846	1,408	2,916	58.0
Teller	1,184	1,282	2,501	111.3
Average	1,341	1,618	2,553	101.3

'D' indicates that the data was withheld to avoid disclosing information for individual farms.

Table D.4. Cattle population in 30 HPP counties. Source: USDA Census of Agriculture, 1992, 1997.

HPP County	Cattle Population				
	Year			Net Change	Percent change
	1987	1992	1997	1987-1997	1987-1997
Alamosa	14,210	11,219	17,341	3,131	22.03
Archuleta	12,820	10,477	15,299	2,479	19.34
Chaffee	11,263	8,655	11,141	-122	-1.08
Conejos	38,867	40,656	45,348	6,481	16.67
Custer	12,059	11,323	11,530	-529	-4.39
Delta	41,635	53,164	52,528	10,893	26.16
Fremont	16,017	17,989	16,080	63	0.39
Garfield	41,036	35,929	39,954	-1,082	-2.64
Grand	24,381	25,927	25,228	847	3.47
Gunnison	30,343	30,713	29,229	-1,114	-3.67
Hinsdale	1,563	2,192	1,471	-92	-5.89
Huerfano	27,452	25,789	26,785	-667	-2.43
Jackson	27,452	45,005	47,683	20,231	73.70
Lake	311	974	1,858	1,547	497.43
La Plata	34,266	32,686	33,907	-359	-1.05
Mesa	54,946	54,406	71,672	16,726	30.44
Mineral	0	0	498	498	0.00
Moffat	27,044	25,504	41,829	14,785	54.67
Montrose	55,750	59,201	60,599	4,849	8.70
Ouray	11,112	9,378	11,297	185	1.66
Park	10,074	12,741	13,045	2,971	29.49
Pueblo	63,688	52,266	51,278	-12,410	-19.49
Rio Blanco	35,711	35,740	33,910	-1,801	-5.04
Rio Grande	16,567	16,480	22,698	6,131	37.01
Routt	30,973	37,042	45,718	14,745	47.61
Saguache	31,203	32,468	46,308	15,105	48.41
San Juan	0	0	0	0	0.00
San Miguel	9,896	10,148	10,490	594	6.00
Summit	2,998	2,849	2,795	-203	-6.77
Teller	2,863	4,275	4,002	1,139	39.78
30 HPP Counties	686,500	705,196	791,521	105,021	15.30
Colorado	2,946,334	3086717	3,307,301	360,967	12.25

Table D.5. Sheep population in 30 HPP counties. Source: USDA Census of Agriculture, 1992, 1997.

HPP County	Sheep Population				
	Year			Net Change	Percent Change
	1987	1992	1997	1987-1997	1997-1987
Alamosa	4,982	5,670	2,143	-2,839	-57.0
Archuleta	2,222	1,367	906	-1,316	-59.2
Chaffee	159	156	182	23	14.5
Conejos	22,261	20,015	15,430	-6,831	-30.7
Custer	0	0	120	120	0.0
Delta	14,403	9,186	14,197	-206	-1.4
Fremont	446	1,152	498	52	11.7
Garfield	19,073	25,617	16,844	-2,229	-11.7
Grand	419	327	622	203	48.4
Gunnison	7,924	0	0	-7,924	-100.0
Hinsdale	0	0	0	0	0.0
Huerfano	222	713	222	0	0.0
Jackson	222	868	445	223	100.5
Lake	0	0	0	0	0.0
La Plata	6,991	6,812	7,850	859	12.3
Mesa	18,620	18,728	9,906	-8,714	-46.8
Mineral	0	0	0	0	0.0
Moffat	59,506	90,518	72,715	13,209	22.2
Montrose	61,293	49,599	35,427	-25,866	-42.2
Ouray	9,378	1,341	570	-8,808	-93.9
Park	837	892	201	-636	-76.0
Pueblo	826	1,032	679	-147	-17.8
Rio Blanco	35,379	30,662	35,959	580	1.6
Rio Grande	17,478	14,047	9,492	-7,986	-45.7
Routt	28,014	20,820	9,932	-18,082	-64.5
Saguache	4,617	14,489	2,512	-2,105	-45.6
San Juan	0	0	0	0	0.0
San Miguel	11,296	4,641	0	-11,296	-100.0
Summit	0	0	0	0	0.0
Teller	57	0	109	52	91.2
30 HPP Counties	326,625	318,652	236,961	-89,664	-27.5
Colorado	708,070	730,272	593,755	-114,315	-16.1

Table D.6. County data on the number of farms with annual agriculture sales over $100,000. Source: USDA Census of Agriculture, 1992, 1997.

Number of Farms by Value of Sales over $100,000				
	Year			Percent change
HPP County	1987	1992	1997	1987-1997
Alamosa	79	79	87	10.13
Archuleta	22	16	15	-31.82
Chaffee	13	9	12	-7.69
Conejos	46	64	66	43.48
Custer	12	8	13	8.33
Delta	66	93	78	18.18
Fremont	15	20	16	6.67
Garfield	39	37	48	23.08
Grand	17	19	20	17.65
Gunnison	24	27	23	-4.17
Hinsdale	D	2	D	0.00
Huerfano	21	19	18	-14.29
Jackson		45	43	0.00
La Plata	33	27	28	-15.15
Lake	1	1	1	0.00
Mesa	83	98	88	6.02
Mineral	0	1	1	0.00
Moffat	33	35	40	21.21
Montrose	86	96	95	10.47
Ouray	9	7	9	0.00
Park	7	12	7	0.00
Pueblo	67	79	70	4.48
Rio Blanco	46	48	40	-13.04
Rio Grande	97	104	117	20.62
Routt	44	42	50	13.64
Saguache	74	92	88	18.92
San Juan	D	D	D	0.00
San Miguel	11	9	6	-45.45
Summit	4	4	4	0.00
Teller	1	2	3	200.00
Average	35.19	36.50	36.20	9.71

'D' indicates that the data was withheld to avoid disclosing information for individual farms.

Table D.7. County data on the number of farms with agriculture sales under $9,999. Source: USDA Census of Agriculture, 1992, 1997.

Number of Farms by Value of Sales Under $9,999				
	Year			Percent change
HPP County	1987	1992	1997	1987-1997
Alamosa	135	121	102	-24.4
Archuleta	91	76	131	44.0
Chaffee	89	94	104	16.9
Conejos	206	191	168	-18.4
Custer	58	56	78	34.5
Delta	558	561	633	13.4
Fremont	288	352	446	54.9
Garfield	250	246	252	0.8
Grand	71	73	75	5.6
Gunnison	80	76	82	2.5
Hinsdale	6	5	6	0.0
Huerfano	126	127	142	12.7
Jackson	D	25	34	
La Plata	442	438	487	10.2
Lake	10	9	13	30.0
Mesa	778	862	995	27.9
Mineral	7	16	5	-28.6
Moffat	170	185	209	22.9
Montrose	425	402	422	-0.7
Ouray	41	39	36	-12.2
Park	101	102	117	15.8
Pueblo	371	354	361	-2.7
Rio Blanco	108	114	96	-11.1
Rio Grande	109	97	105	-3.7
Routt	206	250	267	29.6
Saguache	83	68	65	-21.7
San Juan	D	D	3	0.0
San Miguel	45	55	43	-4.4
Summit	10	12	19	90.0
Teller	40	60	56	40.0
County Average	175.14	174.69	185.07	11.16

'D' indicates that the data was withheld to avoid disclosing information for individual farms.

Table D.8. Number of farms in Colorado. Source: USDA Census of Agriculture, 1987, 1997.

Number of Farms in Colorado						
HPP	**Year**				**Percent Change**	
Committee	**1982**	**1987**	**1992**	**1997**	**1982-1997**	**1992-1997**
Alamosa	306	327	303	306	0.0	1.0
Archuleta	128	152	160	206	60.9	28.8
Chaffee	135	160	157	189	40.0	20.4
Conejos	435	439	452	429	-1.4	-5.1
Custer	130	130	131	152	16.9	16.0
Delta	937	900	943	1041	11.1	10.4
Fremont	368	412	467	561	52.4	20.1
Garfield	407	480	448	475	16.7	6.0
Grand	138	163	149	161	16.7	8.1
Gunnison	170	173	173	187	10.0	8.1
Hinsdale	19	16	16	14	-26.3	-12.5
Huerfano	252	243	253	273	8.3	7.9
Jackson	123	126	126	126	2.4	0.0
La Plata	625	682	709	781	25.0	10.2
Lake	17	14	18	20	17.6	11.1
Mesa	1310	1223	1325	1489	13.7	12.4
Mineral	14	11	17	10	-28.6	-41.2
Moffat	296	330	350	389	31.4	11.1
Montrose	808	826	812	866	7.2	6.7
Ouray	85	88	76	79	-7.1	3.9
Park	146	162	166	183	25.3	10.2
Pueblo	630	615	617	664	5.4	7.6
Rio Blanco	184	231	240	255	38.6	6.3
Rio Grande	352	345	339	348	-1.1	2.7
Routt	362	405	438	494	36.5	12.8
Saguache	244	254	248	250	2.5	0.8
San Juan	1	3	1	4	300.0	300.0
San Miguel	78	84	97	83	6.4	-14.4
Summit	24	21	22	35	45.8	59.1
Teller	65	67	81	87	33.8	7.4
30 HPP Committees	10,771	11,069	11,326	12,154	12.8	7.3
State of Colorado	27,111	27,284	27,152	28,268	4.3	4.1

Table D.9. Hectares of land in agriculture in Colorado. Source: USDA Census of Agriculture, 1987, 1992, 1997.

	Land in Agriculture (hectares)					
	Year				Percent Change	
HPP Committee	1982	1987	1992	1997	1982-1997	1992-1997
Alamosa	91,460	84,805	83,952	76,886	(16)	(8.42)
Archuleta	55,847	65,159	62,915	45,596	(18)	(27.53)
Chaffee	44,516	42,604	34,064	34,645	(22)	1.71
Conejos	128,287	122,095	123,265	115,206	(10)	(6.54)
Custer	90,651	60,839	63,456	58,375	(36)	(8.01)
Delta	98,340	108,876	105,514	114,078	16	8.12
Fremont	135,976	123,486	134,211	114,726	(16)	(14.52)
Garfield	185,348	195,841	178,299	172,868	(7)	(3.05)
Grand	114,932	129,330	121,060	101,659	(12)	(16.03)
Gunnison	102,387	91,144	71,765	78,927	(23)	9.98
Hinsdale	4,452	4,006	3,651	3,575	(20)	(2.07)
Huerfano	285,306	260,236	259,712	259,456	(9)	(0.10)
Jackson	181,706	186,189	191,021	193,063	6	1.07
La Plata	238,362	248,309	237,690	234,775	(2)	(1.23)
Lake	4,047	4,470	5,832	6,956	72	19.27
Mesa	178,468	176,785	170,064	168,599	(6)	(0.86)
Mineral	4,856	4,870	6,288	-	(100)	(100.00)
Moffat	424,952	417,892	469,365	417,272	(2)	(11.10)
Montrose	172,803	174,257	181,063	150,497	(13)	(16.88)
Ouray	70,011	-	48,274	47,311	(32)	(2.00)
Park	163,899	161,912	157,385	125,932	(23)	(19.98)
Pueblo	394,573	361,058	363,005	332,892	(16)	(8.30)
Rio Blanco	173,612	204,559	221,178	188,696	9	(14.69)
Rio Grande	96,316	89,499	88,875	93,780	(3)	5.52
Routt	246,456	238,519	233,262	210,689	(15)	(9.68)
Saguache	196,275	191,092	187,002	194,875	(1)	4.21
San Juan	-	-	-	-		
San Miguel	63,536	68,495	81,211	65,534	3	(19.30)
Summit	15,378	13,908	15,567	13,978	(9)	(10.21)
Teller	30,352	33,703	42,092	33,769	11	(19.77)
30 County Average	3,993,104	3,863,938	3,941,037	3,654,613	(8)	(7.27)
State of Colorado	13,572,493	13,779,060	13,716,170	13,206,743	(3)	(3.71)

Table D.10. Average size of farms in Colorado. Source: USDA Census of Agriculture, 1987, 1992, 1997.

	Average Size Farm (Hectares)					
HPP	**Year**				**Percent Change**	
Committee	**1982**	**1987**	**1992**	**1997**	**1982-1997**	**1992-1997**
Alamosa	299	259	277	251	-16	-9
Archuleta	435	429	393	221	-49	-44
Chaffee	331	266	217	183	-45	-15
Conejos	295	278	273	269	-9	-1
Custer	697	468	484	384	-45	-21
Delta	105	121	112	110	5	-2
Fremont	369	300	287	204	-45	-29
Garfield	455	408	398	364	-20	-9
Grand	834	794	813	631	-24	-22
Gunnison	603	527	415	422	-30	2
Hinsdale	233	251	228	255	10	12
Huerfano	1132	1071	1027	950	-16	-7
Jackson	1478	1478	1516	1532	4	1
La Plata	382	364	335	301	-21	-10
Lake	245	319	324	348	42	7
Mesa	136	144	128	113	-17	-12
Mineral	335	443	370	0	-100	-100
Moffat	1436	1266	1341	1073	-25	-20
Montrose	214	211	223	174	-19	-22
Ouray	824	0	635	599	-27	-6
Park	1122	1000	948	688	-39	-27
Pueblo	626	587	588	501	-20	-15
Rio Blanco	943	885	921	740	-22	-20
Rio Grande	273	259	262	270	-1	3
Routt	681	589	533	427	-37	-20
Saguache	805	752	748	786	-2	5
San Juan	0	0	0	0		
San Miguel	814	815	837	790	-3	-6
Summit	643	662	708	399	-38	-44
Teller	470	503	520	402	-14	-23
30 County Average	574	515	529	446	-22	-16
Colorado	501	505	507	467	-7	-8

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